

Huntley Wood Investments

DRAGON PARC, ABERCANAID, MERTHYR TYDFIL

Site Investigation Report

12392/LW/19/SI

CLIENT: **Huntley Wood Investments**

PROJECT: **Dragon Parc, Abercanaid, Merthyr Tydfil**

TITLE: **Site Investigation Report**

JOB NO: **12392**

DOCUMENT REF: **12392/LW/19/SI**

Revision	Purpose Description	Originated	Reviewed	Authorised	Date
0	Final	LW	HP	RB	April 2019

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1.0 INTRODUCTION

1.1 GENERAL

Huntley Wood Investments are proposing to reclaim and redevelop a site at Dragon Parc, Abercanaid, Merthyr Tydfil for residential end-use.

Intégral Géotechnique (Wales) Limited have been appointed as the Geotechnical Engineers to undertake a site investigation to enable a geotechnical and geoenvironmental appraisal of the site and provide a basis for design.

This report presents the findings of the site investigation and gives recommendations for the design of foundations, floor slabs and other geotechnical and geoenvironmental aspects of the project.

A desk study and a coal mining risk assessment has previously been completed by Intégral Géotechnique and reference should be made to Desk Study Report Ref. 11708/LW/19/DS and the Coal Mining Risk Assessment Report Ref. 11708/LW/16/CMRA.

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1.2 PROPOSED DEVELOPMENT

The proposed development will comprise the construction of a number of 2 and 3 storey residential dwellings, the exact layout of which has not been made available to us. The development is also likely to include associated infrastructure such as access roads, car parking areas, areas of landscaping and private gardens.

1.3 SCOPE OF WORKS

The work instructed included an intrusive investigation, followed by laboratory testing, on site monitoring and geotechnical and geoenvironmental reporting.

1.3 SCOPE OF WORKS (CONTINUED)

The desk study information was used to make an initial assessment of the site and to design an investigation to be carried out by Intégral Géotechnique. The site investigation was designed in accordance with BS5930+A2:2010, the Code of Practice for Site Investigations, BS10175:2011, the Code of Practice for Investigation of Potentially Contaminated Sites, and 'Development of Land Affected by Contamination: A Guide for Developers' prepared by Welsh Local Government Association (WLGA)/Natural Resources Wales (NRW) Land Contamination Working Group, 2017.

The site investigation included:

- An intrusive investigation was carried out in March and April 2019 comprising the drilling of 19 rotary open boreholes and the machine excavation of 19 trial pits;
- Sampling of soil/fill for laboratory chemical testing; and
- Monitoring for concentrations of methane, carbon dioxide, oxygen, hydrocarbon vapours and gas flow.

1.4 LIMITATIONS

This document is intended to be a working document for further development in discussion with all concerned including the Local Planning Authority, Natural Resources Wales, and the NHBC as appropriate.

"Contamination" is taken throughout the report to mean the "presence of one or more potentially harmful substances as a result of human activity". The use of the term in this way does not imply that harm is being or might be caused by the contamination. It should be noted that "contamination" can have different meanings under different regulatory regimes, for example, planning, building control and Part IIA of the Environmental Protection Act 1990. Naturally elevated concentrations of potentially harmful substances may also be of concern and the significance of any that have been found is also evaluated in this report.

It is important to recognise that there may be areas of contamination that have not been found, or that contaminants are present at concentrations above those that have been found. It is also important to recognise that contamination may be localised and that no investigation, however comprehensive, is capable of finding such occurrences other than by chance.

It should also be noted that vertical and lateral changes in ground conditions may be present between exploratory hole locations.

1.4 LIMITATIONS (CONTINUED)

Access for the intrusive site investigation was limited at the time due to on-going demolition works, areas of hardstanding, presence of buried services and stockpiles of concrete and locally asbestos containing materials (ACM).

Access to the mine entries and around the former above ground tanks was unavailable during the site investigation due to ongoing site clearance works and therefore further investigation is required in these areas.

2.0 THE SITE

2.1 SITE LOCATION AND DESCRIPTION

The site is located in Abercarnaid, approximately 2.5km south of Merthyr Tydfil, at a National Grid Reference of 305460, 204240 see Figure 1.

The site is irregular in shape and occupies an area of approximately 8.13 hectares. The boundaries of the site are defined by the River Taff to the east, an unnamed road to the south and west and commercial properties to the north. A site plan is presented in Figure 2.

The site is situated on gently sloping ground at an approximate elevation of 162m AOD in the east and at an approximate elevation of 157m AOD to the south.

The site is situated on the former floodplain of the River Taff, however the site level has been raised to its current elevation.

At the time of the site investigation, site clearance works were ongoing. The northern area of the site was occupied by an area of overgrown vegetation, grasses and immature trees and localised areas of hardstanding. The north western area was noted as boggy and wet at surface level.

The central area of the site consisted of the footprint of a former factory. At the time of the site investigation, the majority of the former factory floor slab had been broken out and the broken-out concrete was stored in a series of linear stockpiles that traversed across the central area. A stockpile of asbestos containing material, partially covered in vegetation was also located in the central area.

In the western area of the site, the hardstanding remained in-situ. A concrete bund around the former above ground tanks also remained, with the bund filled with water. A small building was also located in the western area.

The southern area was occupied by a former office building, which was being demolished at the time of the site investigation.

2.2 SITE OPERATIONS

Site clearance works, including the removal of hardstanding and demolition of buildings were ongoing.

2.3 SURROUNDING LAND USE

The site lies in an area of mixed residential and commercial use. The River Taff lies to the east of the site.

2.4 AVAILABLE SITE INVESTIGATION DATA

Intégral Géotechnique (Wales) Limited has carried out the following reports on the site:

- Desk Study Report, Ardagh Metal Packaging, Abercanaid, Merthyr Tydfil, dated February 2016 (Reference: 11708/LW/16/DS).
- Coal Mining Risk Assessment, Ardagh Metal Packaging, Abercanaid, Merthyr Tydfil, dated February 2016 (Reference: 11708/LW/16/DS).

The above reports should be read in conjunction with this site investigation report.

2.5 CONSULTATIONS WITH REGULATORS

The Local Authority have not been contacted at this stage.

3.0 PRELIMINARY CONCEPTUAL SITE MODEL

3.1 RISK ASSESSMENT FRAMEWORK

In order to be consistent with current UK government policies and legislation, it is necessary to identify, make decisions on, and take appropriate action to deal with land contamination, in accordance with the procedures specified in the Environment Agency document 'Model Procedures for the Management of Land Contamination CLR-11' (Environment Agency 2004).

The risk assessment process is designed to provide a reasoned, structured and pragmatic mechanism for the identification of any potential human health and controlled waters risks associated with land contamination and where necessary to develop a robust remediation strategy to ensure protection of the sensitive receptors (human health of future residents, controlled waters, etc).

In accordance with the CLR-11 framework, risk is defined as:

'a combination of the probability, or frequency, of occurrence of a defined hazard and the magnitude of the consequence of the occurrence'.

The three essential elements to any risk are defined by CLR-11 as follows:

- A contaminant, or hazard, which is in, on, or under the land and has the potential to cause harm (Source)
- A means by which a receptor can be exposed to, or affected by a contaminant or hazard (Pathway)
- A receptor, i.e. something which could be adversely affected by a contaminant or hazard, such as human health or groundwater (Receptor).

In order for there to be a potential risk, all three of the above elements must be present. If there is a source of contamination and a receptor (for example a resident or site user), then there is only a potential risk if there is a pathway linking the two. Such an active pathway is known as a relevant pollutant linkage. It is possible for the same contaminant to be linked to a receptor via a number of pathways, and hence it is important that all relevant pollutant linkages, to both human health and controlled waters, are separately identified on a site in order that a comprehensive conceptual model can be formed and ultimately a robust remediation strategy designed.

3.1 RISK ASSESSMENT FRAMEWORK (CONTINUED)

Current practice during Generic Quantitative Risk Assessment of land affected by contamination is to use generic soil screening values based on the appropriate proposed end use. These usually comprise risk based Soil Guideline Values (SGVs) or Generic Assessment Criteria (GACs) derived by the Environment Agency's Contaminated Land Exposure Assessment Model (CLEA). The SGVs and the supporting technical guidance were developed in order to assist in the assessment of long term risk to human health from the exposure to contaminated soils.

Revised Statutory Guidance, published in 2012, to support Part 2A of the Environmental Protection Act 1990, introduced a new four category system for classifying land under Part 2A. Category 1 includes land where the level of risk is clearly unacceptable and Category 4 includes land where the level of risk posed is considered to be acceptably low. Under Part 2A, land would be determined as contaminated if it falls within Categories 1 or 2.

The revised Part 2A Statutory Guidance was accompanied by an Impact Assessment that identified a role for new 'Category 4 Screening Levels' (C4SLs) that would provide a simple test for determining when land is suitable for use and definitely not contaminated land. A Policy Companion Document including the C4SLs was published in March 2014 (England) and May 2014 (Wales).

The C4SLs have been based on the CLEA methodology and derived using the CLEA model, with modified toxicological and exposure parameters. To date, C4SLs have been released for six substances (arsenic, cadmium, chromium (VI), lead, benzo(a)pyrene and benzene).

The C4SLs have been derived on the assumption that where they exist, they will be used as generic screening criteria within generic quantitative risk assessment.

Following publication of the C4SLs, Land Quality Management (LQM), in conjunction with the Chartered Institute for Environmental Health (CIEH) released Suitable 4 Use Levels (S4ULs) in January 2015.

The S4ULs have been derived in accordance with UK legislation, and using a modified version of the Environment Agency's CLEA software. As such, the S4ULs are based on the concept of minimal or tolerable risk as described in Human Health Toxicological Assessment of Contaminants in Soil (Science Report SR2, Environment Agency 2009a).

S4ULs have been derived for a wider number of substances.

3.1 RISK ASSESSMENT FRAMEWORK (CONTINUED)

In addition to the existing SGVs, C4SLs and S4ULs, Atkins ATRISK^{soil} also provide a set of Soil Screening Values. These are currently intended to be used in conjunction with SGVs, although they intend to update these values in line with the C4SLs in due course.

We have reviewed all sets of values and intend to use the most appropriate assessment criteria as Tier 1 screening values in the first instance. Where a published C4SL is available, and considered appropriate, this will be used in the first instance.

3.2 CONCEPTUAL MODEL FRAMEWORK

The preliminary stage of the risk assessment process is to develop and define a conceptual site model, based on the desk study and any existing site investigation data. This is used to establish any potential contaminant sources, identify existing and future receptors and assess if there are any potentially active pathways by which a potential risk may be present.

The preliminary conceptual site model will be developed and refined as site specific data is gathered, such as actual ground conditions and chemical data, resulting in a more robust conceptual understanding of the site.

3.3 CRITICAL SENSITIVE RECEPTOR – HUMAN HEALTH

The proposed redevelopment of the site is for a residential end use. Therefore, the critical sensitive receptor from a human health perspective is an on site residential receptor.

In accordance with S4UL/C4SL and CLEA guidance for a standard residential scenario, the critical sensitive receptor for a residential end use risk assessment is a female child, with exposure from 0 to 6 years.

The standard residential end use conceptual model defined by S4UL/C4SL and CLEA is assumed to be suitable for the purposes of this assessment.

3.4 CRITICAL SENSITIVE RECEPTOR – CONTROLLED WATERS

Based on the proposed redevelopment of the site for a residential end use, and the findings of the desk study, the critical sensitive receptor from a controlled water perspective is groundwater within the Secondary 'A' Aquifer of the Alluvial Deposits

3.4 CRITICAL SENSITIVE RECEPTOR – CONTROLLED WATERS (CONTINUED)

By considering groundwater as the critical sensitive receptor for controlled waters, the groundwater/hydrogeological risk assessment will also be protective of the River Taff to the east of the site.

3.5 POTENTIAL CONTAMINANT SOURCES

As identified in the desk study, the extensive historical land uses at the site since the 1800's has resulted in a list of potentially contaminative uses that include the stockpiling of colliery waste and surface workings of the underground mine and later a factory for printing, metal packaging and production of cargo restraints. There is evidence of above ground storage tanks being present on site.

The potential types of contaminants of concern are listed below:

- Metals, semi-metals, and inorganics within the shallow made ground;
- Polyaromatic hydrocarbons (PAH) within the shallow made ground;
- Polychlorinated biphenyl (PCB) within the shallow made ground;
- Petroleum Hydrocarbons (VPH/EPH), Volatile and Semi Volatile Organic Compounds (VOC/SVOC) within the shallow made ground and possible underground storage tanks; and
- Asbestos within the shallow made ground and asbestos containing materials (ACM) within the building fabric, structures and services.

3.6 POTENTIAL EXPOSURE PATHWAYS

Potential exposure pathways for the critical receptors (both human health and controlled waters) are listed below:

- Dermal contact with soil and/or soil derived dust;
- Ingestion of soil and/or soil attached to home-grown produce;
- Ingestion of home-grown produce;
- Inhalation of soil derived dust;
- Inhalation of vapours – indoor and outdoor air;
- Leaching of contaminants from made ground to groundwater; and
- Transportation of contaminants within groundwater.

3.6 POTENTIAL EXPOSURE PATHWAYS (CONTINUED)

In addition, the following exposure pathways have also been considered:

- Ground gas generation and migration; and
- Building materials durability.

3.7 SUMMARY OF CONCEPTUAL EXPOSURE MODEL

A preliminary conceptual exposure model has been developed for the site. This is based on the findings of the desk study, historical review and site walk over and includes all potential sources, pathways and receptors that may be present on site. Those that have been identified as being potentially active require further investigation in the form of sampling and testing of soils and groundwater, followed by appropriate risk assessment.

The preliminary conceptual exposure model will be reviewed and refined following the completion of the site works and laboratory testing.

The preliminary conceptual exposure model is presented below in Table 1.

3.7 SUMMARY OF CONCEPTUAL EXPOSURE MODEL (CONTINUED)

Table 1: Preliminary Conceptual Exposure Model				
Source		Receptor	Pathway	Potentially Active Pathway?
Origin	Contaminant			
Made Ground of unknown origin and historical land uses	Metals, semi-metals, non-metals, PAH, petroleum hydrocarbons, PCBs, VOCs/SVOCs, asbestos	Resident – human health	Dermal Contact with made ground/dust	✓
			Ingestion of soil and/or soil attached to home-grown produce	✓
			Ingestion of home-grown produce	✓
			Inhalation of dust	✓
			Inhalation of vapours – indoor/outdoor	✓
	Metals, semi-metals, inorganics, PAH, petroleum hydrocarbons, PCBs, VOCs/SVOCs.	Groundwater quality	Leaching from made ground	✓
	Metals, semi-metals, inorganics, PAH, petroleum hydrocarbons, PCBs, VOCs/SVOCs.	Surface water quality	Transportation within groundwater	✓
Above ground and in ground storage tanks	Petroleum hydrocarbons	Resident – human health	Inhalation of Vapours – indoor/outdoor	✓
	Petroleum hydrocarbons	Groundwater quality	Localised spillage	✓
	Petroleum hydrocarbons	Surface water quality	Transportation within groundwater	✓
Made Ground of unknown origin and natural ground	pH and sulphates	Building Materials Durability	Direct contact	✓
Ground Gas – organic, gas producing materials	Methane, carbon dioxide	Human health	Accumulation of gases in confined spaces, and/or migration off site, leading to asphyxiation, or risk of explosion	✓

4.0 THE SITE INVESTIGATION

4.1 FIELDWORKS

An intrusive site investigation was designed in accordance with BS5930:2015, the Code of Practice for Site Investigations, BS10175:2011, the Code of Practice for Investigation of Potentially Contaminated Sites, and 'Development of Land Affected by Contamination: A Guide for Developers' prepared by Welsh Local Government Association (WLGA)/Natural Resources Wales (NRW) Land Contamination Working Group, 2017.

The intrusive site investigation was also designed to provide information to support and refine the preliminary conceptual site model/conceptual exposure model.

An intrusive investigation comprising of the drilling of 19 rotary open boreholes and the machine excavation of 19 trial pits, was carried out in March and April 2019.

The rotary open boreholes were drilled down to a maximum depth of 30.0m below existing ground level. The purpose of the rotary open boreholes was to investigate the deeper ground conditions including the presence or otherwise of any shallow coal seams or unrecorded mineworkings and to allow an assessment of the most appropriate foundation type for the proposed development. Shallow ground gas monitoring standpipes were installed within six boreholes, in order to allow ground gases to be monitored.

The trial pits were excavated to a maximum depth of 3.8m below existing ground level. The purpose of the trial pits was to investigate the shallow ground conditions and to allow an assessment of the most appropriate foundation types for the proposed development.

The exploratory hole locations were approximately surveyed to national grid reference using a hand held GPS unit. The accuracy is estimated to be nominally within 3m to 4m.

Representative soil samples were taken from the trial pits for laboratory chemical testing and placed in the appropriate sample containers deemed suitable for the analysis required. Strict protocols were adopted during this process to limit the cross contamination of samples.

A programme of gas monitoring was commenced as soon as the site works were complete.

4.1 FIELDWORKS (CONTINUED)

The fieldworks were supervised by a qualified Geotechnical Engineer from Intégral Géotechnique (Wales) Limited who also logged the trial pits and prepared their detailed engineering logs in accordance with the requirements of BS5930+A2: 2010. The engineering logs provide descriptions of the materials encountered in accordance with BSEN ISO 14688-1 (2002) and 14689-1 (2003) for soils and rocks respectively.

The rotary open boreholes logs are based on the drillers logs.

The approximate locations of the boreholes and trial pits are shown on Figure 2, while their logs are presented in Appendices A and B, respectively.

4.2 FIELD OBSERVATIONS

Made ground consisting of general colliery spoil was encountered across the entire site.

A stockpile of asbestos containing material, that is partially overgrown was noted in the central area of the site.

4.3 LABORATORY CHEMICAL TESTING

Representative soil samples were taken from the trial pits across the site, stored at the appropriate temperature and dispatched to the laboratories of i2 Analytical for laboratory chemical testing within 24 hours.

The samples were tested for a range of contaminants that reflects the historical use of the site, the findings of the desk study and the preliminary conceptual site model/conceptual exposure model. A list of the soil testing carried out is given below:

Beryllium	Cadmium
Total Chromium	Hexavalent Chromium (VI)
Copper	Lead
Mercury	Nickel
Vanadium	Zinc
Arsenic	Boron
Selenium	Elemental Sulphur
Total Cyanide	Total Sulphate
Sulphide	Water Soluble Sulphate
pH	Monohydric Phenol
Polycyclic Aromatic Hydrocarbons (PAH)	Petroleum Hydrocarbons (VPH/EPH)

4.3 LABORATORY CHEMICAL TESTING (CONTINUED)

Polychlorinated biphenyl (PCB)

Asbestos

Selected samples were also tested for Volatile and Semi Volatile Organic Compounds (VOC/SVOC).

The results of all the soil testing are presented in Appendix C.

4.6 IN-SITU GAS MONITORING

Gas monitoring standpipes were installed in six of the rotary open boreholes and these have been monitored at fortnightly intervals following completion of the fieldworks.

The gas monitoring programme commenced on 24 April 2019.

The concentration levels of methane, carbon dioxide and oxygen were measured in the standpipes during each visit by using a GA5000 Landfill Gas Analyser. In addition, gas flow rate and the atmospheric pressure at the time of the field measurements were also recorded.

Gas monitoring was carried out over a range of atmospheric pressures to include at least one reading in low and/or falling pressure, in accordance with the recommendations made in CIRIA Report C665.

At the time of writing the programme of gas monitoring was on going. A complete set of ground gas monitoring results will be forwarded as an addendum upon completion of the monitoring programme.

The results of the field gas monitoring to date are presented in Appendix D.

5.0 GROUND CONDITIONS

5.1 SHALLOW GROUND CONDITIONS

Information regarding the shallow ground conditions was predominantly derived from the trial pits excavated across the site.

The majority of the site was either covered by tarmac or concrete hardstanding, which had recently been broken out, in some areas the hardstanding remained in-situ. Areas of soft landscaping consisting of over grown vegetation and grasses with some immature trees were located in the north of the site.

The shallow ground conditions encountered generally consisted of made ground overlying superficial deposits.

5.1.1 MADE GROUND

The made ground comprised of clayey, locally very clayey silty sandy gravel. The gravel consisted of colliery spoil with varying content of siltstone, mudstone, brick, concrete, ash, clinker, slag materials, fine coal fragments and fragments of ceramics, metal, glass and timber.

Frequent cobbles and some boulders of siltstone and mudstone and locally brick and concrete were encountered within the trial pits.

Locally intact concrete obstructions were encountered at shallow depths, particularly in the central area of the site within the footprint of the former factory.

A hydrocarbon odour was noted within trial pit TP03.

Within the majority of the trial pits, the base of the made ground was not encountered.

Within the rotary open boreholes, the made ground was encountered to typical depths of between 3.8m and 6.4m and locally deeper at depths of between 7.0m and 11.5m below existing ground level. The made ground generally deepens from west to east.

The base of the made ground was encountered within two trial pits TP06 and TP12, at depths of 2.5m and 2.0m below existing ground level respectively.

5.1.2 SHAFTS

As stated in the Coal Mining Risk Assessment, referenced 11708/LW/16/CMRA dated February 2016, the Coal Authority Report indicated that there are seven mine entries within or within 20m of the site. Two of the recorded mine entries are located within the site and the remaining mine entries are clustered along the south west boundary.

Mine shaft reference, 305204-031 and mine adit reference, 305204-069 are recorded on site. According to the Coal Authority Records the shaft was grouted and capped in 1977. No treatment details are provided for the adit.

During the site investigation access to the area of the mine entries was unavailable due to an ACM stockpile and in-situ hardstanding/floor slabs and remnant foundations.

These mine entries will require further investigation when access is available.

5.1.3 SUPERFICIAL DEPOSITS

The made ground was underlain by superficial deposits.

The superficial deposits were encountered in two of the trial pits (TP06 and TP12). The deposits were variable and consisted of soft slightly gravelly clay/silt or sandy silt or loose clayey sandy gravels with cobbles.

Limited information was obtained about the superficial deposits from the trial pits, due to the thickness of the overlying made ground deposits.

The rotary drillers logs noted the superficial deposits as Till, with silts, sands, gravels and cobbles.

The depth of the superficial deposits were encountered to typical depths of between 7.1m and 17.8m below existing ground level. In the eastern area of the site, closer to the River Taff, the superficial deposits were encountered to depths of between and 23.4 and >30.0m below existing ground level.

It is recommended that cable percussion boreholes are drilled on site to confirm the nature and geotechnical properties of the superficial deposits.

5.2 DEEPER GROUND CONDITIONS

The rotary open boreholes were located across the site. A total of 19 boreholes were drilled on site to a depth of 30.0m below existing ground level.

5.2 DEEPER GROUND CONDITIONS (CONTINUED)

The deeper rotary open boreholes were principally drilled on site to profile the depth to rock head and identify the presence and nature of any shallow coal seams and associated mining voids. When using an openhole rotary drilling technique it is difficult to distinguish between made ground, superficial material and weathered bedrock.

As stated in Section 5.1.1, the boreholes generally encountered made ground to depths of between 3.8m and 6.4m and locally deeper at depths of between 7.0m and 11.5m below existing ground level. The depth of the made ground generally deepening from west to east.

The made ground was underlain by superficial deposits which according to the driller's descriptions consisted of variable silts, sands and gravels. The superficial deposits were encountered to typical depths of between 7.1m and 17.8m below existing ground level. In the eastern area of the site, closer to the River Taff, the superficial deposits were encountered to depths of between 23.4 and >30.0m below existing ground level.

The boreholes generally encountered the top of the bedrock at depths of between 10.0m and 27.0m below existing ground level.

In boreholes PH9, PH12, PH14, PH16 and PH19 bedrock was not encountered due to the thickness of the overlying superficial deposits.

Nine of the boreholes encountered one or more coal seams, with thicknesses typically ranging from 0.2m and 1.4m.

Across the site the following coal seams were encountered:

- PH1 at 17.0m to 18.4m;
- PH2 at 21.8m to 22.5m;
- PH3 at 19.7m to 21.1m;
- PH5 at 16.0 to 17.3m;
- PH10 at 19.7m to 21.0m;
- PH11 at 23.2m to 24.4m;
- PH13 at 16.7m to 19.7m;
- PH15 at 14.9 to 15.7m, 18.0m to 18.2m and 19.0m to 19.3m;
- PH17 at 21.0m to 21.8m.

One borehole, PH4 encountered evidence of old workings at depths of between 17.6m and 19.1m below existing ground level. Within borehole PH5, soft drilling conditions with poor returns was encountered directly below a coal seam at depths of between 17.3m and 18.1m below existing ground level.

5.2 DEEPER GROUND CONDITIONS (CONTINUED)

Within borehole PH11, broken ground was noted within sandstone at depths of between 18.9m and 19.9m below existing ground level. As the broken ground is located within a sandstone block, it is likely to be associated with a fault or weakness in the sandstone.

5.3 GROUNDWATER

During the excavation of the trial pits, groundwater was encountered within three trial pits (TP07, TP13, TP15) at depths of between 1.0m and 2.0m below existing ground level. However, the made ground was often noted as damp/wet. Within TP01, quick inflow was noted from surface level and in the upper layers of the made ground.

During drilling of the boreholes, groundwater was encountered within the superficial deposits at depths of between 6.0m and 22.5m and noted as significant inflows.

The groundwater conditions are based on observations made at the time of the fieldwork. It should be noted that groundwater levels may vary due to seasonal and other effects.

Groundwater levels were also measured during visits to site to monitor ground gas, installed within the made ground at six locations. During the first monitoring round water was recorded within one installation, PH1 at a depth of 4.8m below existing ground level. The remaining five installations were recorded as dry.

6.0 CONTAMINATION

6.1 AVERAGING AREAS

In order to assess the laboratory test results reliably and in context, the data have been grouped into an averaging area. An averaging area (or area of interest) is that area of soil to which a receptor is exposed or which otherwise contributes to the creation of hazardous conditions. This may be an area of historical industrial usage, a soil type, or a specific proposed end use.

6.2 SOIL CONTAMINATION

The Suitable 4 Use Levels (S4ULs) derived by LQM have been adopted as critical concentrations against which soil contaminant concentrations can be compared. In the absence of additional published S4ULs for lead and cyanide, Category 4 Screening Level (C4SL) published by DEFRA and Soil Screening Values (SSVs) derived by Atkins ATRISK^{soil} for a residential with the consumption of home grown produce end use have been adopted, respectively.

Since the results of the testing indicate total organic carbon content (TOC) in the range of 1.3% to 3.8%, the results have been compared to the respective guidelines, where applicable, for 1% soil organic matter content.

With regards to polychlorinated biphenyls (PCBs) the current SGV for the sum of PCDDs, PCDFs and dioxin like PCBs has been adopted, based on a residential with home grown produce scenario. The SGV is 8.0 ug/kg.

The soil test results for made ground have been summarised and are shown in Appendix E.

6.2.1 Made Ground

The results of the laboratory testing indicate that most of the analysed chemical elements or compounds are present at concentrations below the appropriate thresholds. However, the initial screening indicates exceedances of beryllium, mercury, several PAH compounds and a single petroleum hydrocarbon chain.

An elevated concentration of mercury was encountered within a single sample of made ground above the adopted screening value of 1.2mg/kg (S4UL 1% SOM). Mercury was detected at a concentration of 2.2mg/kg in a made ground sample from TP03 at a depth of 0.7m.

6.2 SOIL CONTAMINATION (CONTINUED)

An elevated concentration of beryllium was encountered within a single sample of made ground above the adopted screening value of 1.7mg/kg (S4UL 1% SOM). Beryllium was detected at a concentration of 2.1mg/kg in a sample from TP7 at a depth of 0.4m.

Elevated concentrations of several PAH compounds were detected in a single sample of made ground from TP14 at a depth of 0.3m. Within the made ground sample from TP14 the following PAH compounds were detected at elevated concentrations:

- Benzo(a)anthracene was detected at a concentration of 60mg/kg, elevated above the adopted screening value of 7.2mg/kg (S4UL 1% SOM).
- Benzo(a)pyrene was detected at a concentration of 47mg/kg, elevated above the adopted screening value of 2.2mg/kg (S4UL 1% SOM).
- Benzo(b)fluoranthene was detected at a concentration of 76mg/kg, elevated above the adopted screening value of 2.6mg/kg (S4UL 1% SOM).
- Chrysene was detected at a concentration of 54mg/kg, elevated above the adopted screening value of 15.0mg/kg (S4UL 1% SOM).
- Dibenzo(ah)anthracene was detected at a concentration of 11mg/kg, elevated above the adopted screening value of 0.2mg/kg (S4UL 1% SOM).

An elevated concentration of a petroleum hydrocarbon chain was detected in one made ground sample. Aromatic C16-C21 was detected at a concentration of 400mg/kg in a sample from TP14 at a depth of 0.3m, elevated above the adopted screening value of 260mg/kg (S4UL 1% SOM).

Further to the above, a petroleum hydrocarbon odour was noted within TP03, however the laboratory test results for the made sample from trial pit TP03 indicate that the petroleum hydrocarbon bands are detected at concentrations below the appropriate thresholds.

The results of the laboratory testing for PCB congeners indicate that the concentrations of the PCB congeners (total sum) are below or equal to the current residential SGV of 8ug/kg for the PCDDs, PCDFs and dioxin-like PCBs. The majority of the PCB congeners (total sum) were detected below the laboratory limit of detection.

The test results of the laboratory VOC testing indicate that the analysed compounds are below the laboratory limit of detection.

6.2 SOIL CONTAMINATION (CONTINUED)

The results of the laboratory SVOC testing indicate that the majority of the tested compounds are below the laboratory limit of detection. The compounds detected above the laboratory limit of detection are the PCB congeners and PAH compounds which were discussed above. The detected PCB congeners were detected at concentrations below the appropriate threshold. The PAH compounds detected above the limit of detection in a single made ground sample are indicated above and within the summary sheet included in Appendix E.

Asbestos fibres were not detected within the screened samples. However, a stockpile of asbestos containing materials was noted on site.

6.2.2 In-situ Natural Ground

No visual or olfactory evidence of contamination of the in-situ natural ground was identified during the drilling of the boreholes and excavation of the trial pits. At the time of writing this report no samples of natural ground had been tested. It is considered likely that concentrations of determinands within the natural ground are likely to be naturally occurring and as such, the natural ground poses no significant threat to human health or the environment.

6.3 GROUND GASES

Ground gas was monitored on a fortnightly basis using a GA 5000 Gas Analyser. The results of the gas monitoring programme to date are included in Appendix D. A summary of the results is given in the following Table 2.

Table 2: Summary of Ground Gas Results				
Borehole	Maximum Methane Concentration (%)	Maximum Carbon Dioxide Concentration (%)	Minimum Oxygen Concentration (%)	Gas Flow Rate (l/hr)
PH01	<0.5	0.6	21.2	<0.3
PH08	<0.5	2.1	18.1	<0.3
PH10	<0.5	0.4	20.2	<0.3
PH13	<0.5	0.1	20.1	<0.3
PH16	<0.5	0.3	20.2	<0.3
PH18	<0.5	0.1	20.1	<0.3

Note: Results based on one round of monitoring completed to date.

The results show a maximum methane concentration of <0.5% and a maximum carbon dioxide concentration of 2.1%. A maximum gas flow rate of 0.3l/hr was measured during the gas monitoring programme to date.

7.0 REVISED CONCEPTUAL EXPOSURE MODEL

The preliminary conceptual exposure model has been reviewed and revised to reflect the findings of the site investigation and the results of the laboratory testing of soils, soil leachate, groundwater and gas monitoring. Pathways identified as a relevant pollutant linkage require appropriate risk assessment or mitigation measures (see Section 8).

Table 3: Revised Conceptual Exposure Model						
Source		Receptor	Pathway	Preliminary Active Pathway? (see Sect. 5.8)	Relevant Pollutant Linkage	Justification/ Mitigation
Origin	Contaminant					
Made Ground of unknown origin and historical land uses	Metals, semi-metals, non-metals, PAH, petroleum hydrocarbons, PCB, VOCs/SVOCs asbestos	Resident – human health	Dermal Contact with made ground/dust	✓	✓	Elevated concentrations of mercury, beryllium, a single hydrocarbon chain and PAH compounds identified within the made ground – risk assess.
			Ingestion of soil and/or soil attached to home-grown produce	✓	✓	
			Ingestion of home-grown produce	✓	✓	
			Inhalation of dust	✓	✓	
			Inhalation of vapours – indoor/outdoor	✓	X	No sufficiently volatile contaminants identified.
	Metals, semi-metals, inorganics, PAH, petroleum hydrocarbons, PCBs, VOCs/SVOCs	Groundwater quality	Leaching from made ground	✓	✓	Elevated concentrations of mercury, beryllium, a single hydrocarbon chain and PAH compounds identified within the made ground – risk assess.

7.0 REVISED CONCEPTUAL EXPOSURE MODEL (CONTINUED)

Source		Receptor	Pathway	Preliminary Active Pathway?	Relevant Pollutant Linkage	Justification/ Mitigation
Origin	Contaminant					
Made Ground of unknown origin and historical land uses	Metals, semi-metals, inorganics, PAH, petroleum hydrocarbons, PCBs, VOCs/SVOCs	Surface water quality	Transportation within groundwater	✓	✓	Elevated concentrations of mercury, beryllium, a single hydrocarbon chain and PAH compounds identified within the made ground – risk assess
Above ground and in ground storage tanks	Petroleum hydrocarbons	Resident – human health	Inhalation of Vapours – indoor/outdoor	✓	✓/X	Above ground storage tanks identified, however access was unavailable during the site investigation works. Further testing should be undertaken below the tanks when access is available. No underground storage tanks identified at this stage.
	Petroleum hydrocarbons	Groundwater quality	Localised spillage	✓	✓/X	
	Petroleum hydrocarbons	Surface water quality	Transportation within groundwater	✓	✓/X	
Made Ground of unknown origin and natural ground	pH and water soluble sulphate	Building Materials Durability	Direct contact	✓	✓	Building materials will be in contact with made ground – risk assess
Ground Gas – organic, gas producing materials	Methane, carbon dioxide	Human health	Accumulation of gases in confined spaces, and/or migration off site, leading to asphyxiation, or risk of explosion	✓	✓	Potential gas producing materials may be present. Gas monitoring programme ongoing – risk assess

8.0 RISK ASSESSMENT

8.1 METHODOLOGY

The risk of pollution, health effects or environmental harm occurring as a result of ground contamination is dependent upon three principal factors:

- The scale of the contamination sources;
- The presence of sensitive “receptors”, e.g. Humans: health of the general public, site occupiers, redevelopment workers. Environment: flora, fauna, etc;
- The existence of migration pathways by which contaminants can reach the sensitive receptors.

This section assesses each of these factors in order to evaluate the overall level of risk and potential harm to receptors. The receptor may be human, a water resource, an eco-system or construction materials. Pathways connecting a perceived hazard to a receptor are referred to as exposure pathways.

The sources of contamination and the links connecting the hazards to the sensitive receptors will represent the basis for the risk assessment.

8.2 SOURCE-PATHWAY-RECEPTOR MODEL

The preliminary conceptual site model was based on the findings of the desk study. This was later reviewed and refined according to the findings of the site investigation, allowing for the ground conditions encountered and the results of laboratory testing of soil and groundwater. Any pathways considered to be inactive were removed from the model and all remaining potentially active pathways require risk assessment.

The pathways shown as potentially active in the Revised Conceptual Site Model in Section 9.0 above have been assessed below.

8.3 HUMAN HEALTH RISK ASSESSMENT

8.3.1 *Site in its Present Condition*

The site does not pose any risks to casual visitors or trespassers.

8.3 HUMAN HEALTH RISK ASSESSMENT (CONTINUED)

8.3.2 Future Site Users

The contamination test results and investigation observations show locally elevated concentration levels in the made ground (at shallow depth) of mercury, beryllium, a single hydrocarbon chain and several polyaromatic hydrocarbon compounds.

Given the elevated concentrations of mercury, beryllium, petroleum hydrocarbons and PAH compounds within the general made ground encountered across the site, it is considered that a potential risk to human health may exist via the following relevant pollutant linkages:

- Dermal contact,
- Ingestion of soil or soil derived dust,
- Ingestion of soil attached to homegrown produce,
- Ingestion of homegrown produce,
- Inhalation of soil bourn dust.

The inhalation of vapours pathways (indoor and outdoor air) are not considered to be active since the contaminants of concern identified are not sufficiently volatile.

It is therefore considered necessary to protect end users from the elevated concentrations of mercury, beryllium, petroleum hydrocarbons and PAH compounds in the shallow made ground. It is considered necessary to break the above listed relevant pollutant linkages in order to remove the potential risk.

It is recommended that a capping layer, of a minimum thickness of 600mm, of clean imported subsoil and topsoil is placed above a high-vis anti mixing layer in all private gardens and areas of soft landscaping. This would break all the above listed relevant pollutant linkages and removing the potential risk to future end users.

Following the removal of the ACM stockpile, the near surface soils in the vicinity of these areas should be checked and if any residual ACM remain it should be handpicked by a licenced contractor. All asbestos waste generated should be consigned to a licensed tip. It is recommended that validation samples are taken following these site clearance works, in order to confirm the adequate removal of asbestos impacted soils.

Following the completion of the site clearance works and when access is available, the area below the former above ground storage tanks should be inspected and tested for a range of contaminants including asbestos and petroleum hydrocarbons.

8.3 HUMAN HEALTH RISK ASSESSMENT (CONTINUED)

It should be noted that this assessment should be reviewed to include the findings of the recommended further sampling below the tanks and asbestos stockpile. This assessment may therefore be subject to change.

8.3.3 Construction Workers

With future site development works involving the excavation and removal of the made ground, there would be a risk to workers from contaminants in the soils (including asbestos). Appropriate measures are therefore recommended for works involving the made ground materials which are known to be present beneath the site.

The following practical measures are required while excavating/re-using asbestos impacted made ground and the ACM stockpile:

- Excavations will need to be regularly dampened down to prevent any dust that may contain asbestos becoming airborne;
- Any excavated materials should be quarantined and regularly dampened down to prevent any dust that may contain asbestos becoming airborne;
- Appropriate PPE to be worn by all workers and appropriate RPE when required;
- Asbestos/dust/air monitoring;
- All works to be carried out in accordance with an appropriate risk assessment and managed in accordance with the requirements of the Control of Asbestos Regulations 2012.

ACMs identified onsite should be handled by a suitable asbestos awareness trained operator. Allowances should be made for handpicking of any ACMs. All asbestos waste generated should be consigned to a licensed tip.

All excavations should be regularly checked for safe atmospheres.

Normal good hygiene practices should be adequate to protect the health and safety of redevelopment workers, and should include:

- Minimum handling of materials;
- Washing of hands prior to all meal breaks, which should be taken in a designated clean area;
- The use of standard protective clothing such as boots and overalls and gloves, where considered relevant.

In dry weather, inhalation of dust and gases should be avoided preferably by the use of dust suppression techniques to minimise fugitive emissions and minimisation of exposed materials at any particular time.

8.3 HUMAN HEALTH RISK ASSESSMENT (CONTINUED)

Additionally, a system should be established by which any 'unusual' materials that may be encountered are reported rapidly to the site management, so that the appropriate action may be taken, following specialist advice if necessary. An unusual material may be identified on site by colour, odour or physical nature.

Routine visual checks should be made for the presence of any asbestos containing materials (ACM) particularly around the ACM stockpile and below floor slabs and areas of hardstanding. Allowances should be made for handpicking any encountered ACM occurrences.

Reference should be made to the Health and Safety Executive document "Protection of Workers and the General Public during the development of contaminated land" for detailed guidance on these matters.

8.4 RISKS TO VEGETATION

Elevated concentrations of phytotoxic contaminants were not detected within the made ground samples. However, the physical nature of the existing made ground does not provide a suitable growing medium for vegetation.

To ensure viable landscape areas by preventing upward migration of contaminants into the overlying soils, and in order to promote plant growth, any landscaped areas will require the provision of a minimum 600mm thick capping layer of clean, inert subsoil and topsoil materials placed above a high-vis anti mixing layer.

8.5 GROUNDWATER RISK ASSESSMENT

Locally elevated concentrations of mercury, beryllium, a hydrocarbon chain and PAH compounds were sporadically encountered within the made ground located across the site. The made ground comprised mainly of colliery spoil.

The underlying natural ground comprised of variable cohesive and granular superficial deposits.

Perched groundwater was encountered within some trial pits, or the ground was noted at damp/wet. It is considered that the perched groundwater exists as localised pockets within the made ground and not as a site wide water body.

8.5 GROUNDWATER RISK ASSESSMENT (CONTINUED)

Deeper groundwater was encountered within the rotary open boreholes at depths of between 6.0m and 24.0m below existing ground levels, however the superficial deposits underlying the made ground were often noted as wet.

The elevated contaminants have a potential to be leachable and therefore there is a potential risk to groundwater.

To determine the risk to groundwater, it is recommended that further samples are taken from the made ground and tested for leachate potential.

8.6 GROUND GAS RISK ASSESSMENT

The results of the gas monitoring programme indicated a maximum methane concentration of 0.5% and a maximum carbon dioxide concentration of 2.1%. A maximum gas flow rate of 0.3l/hr was measured during the gas monitoring programme.

In accordance with CIRIA Report C665 a Gas Screening Value (GSV) of 0.0063l/hour has been calculated. This GSV corresponds to gas characteristic situation 1/green which does not require any special gas protective measures.

It should be noted that this classification is based on one round of gas monitoring completed to date and may therefore be subject to change. An addendum report will be issued upon completion of the gas monitoring programme, which will include a revised classification.

The desk study report indicates that no radon protection measures are required.

8.7 RISKS TO BUILDINGS AND MATERIALS DURABILITY

8.7.1 Concrete Classification

A summary of the laboratory chemical test results for the chemicals monohydric phenol, sulphur, total sulphate, water soluble sulphate, sulphide and pH, which may adversely affect the durability of building materials is presented in Appendix E.

Evidence to date does not indicate any specifically aggressive conditions, but it would be reasonable to expect a degree of sulphate and acidic aggressiveness from the made ground.

8.7 RISKS TO BUILDINGS AND MATERIALS DURABILITY (CONTINUED)

Made Ground

In accordance with BRE Digest SD1:2005 and adopting the assessment procedure specified therein for brownfield sites, the laboratory chemical test results indicate a characteristic value (taking the mean of the highest two test results) for water soluble sulphate within the made ground of 1800mg/l.

Using Table C2 of BRE Digest SD1:2005, this characteristic value corresponds to Design Sulphate Class DS-3.

The groundwater regime of the site has been assessed as 'mobile' and a characteristic pH value within the made ground of 7.7 has been determined (adopting the lowest of the test results). The Design Sulphate Class has been modified to give a site ACEC class of AC-3 for concrete structures constructed within the made ground.

However, the made ground consists of colliery spoil which is known to contain sulphides in the form of pyrite.

Therefore, any concrete design which will come into contact with the colliery spoil will need to take account of the total potential sulphate content which might result from oxidation following ground disturbance.

The highest total potential sulphate calculated for the made ground is 0.93%.

If the amount of oxidizable sulphides is greater than 0.3% SO_4 then pyrite is probably present. The results of the calculation for the site indicates oxidizable sulphide value of 0.42%.

Natural Ground

If any foundations are to be founded within the natural strata, it is recommended that samples are obtained of the strata and tested for pH and water soluble sulphate to undertake a concrete classification.

8.7 RISKS TO BUILDINGS AND MATERIALS DURABILITY (CONTINUED)

8.7.2 Water Services

Water supply pipes will need to be protected from any contamination present within the ground. In particular, the presence of organic contaminants (such as PAH and TPH) should be addressed when selecting pipe materials. Measures to protect the pipes will include clean backfill to trenches and possibly alternative material selection. Reference should be made to UKWIR Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites, document No. 10/WM/03/21. The final design and selection of the pipe and associated backfill should be agreed with the appropriate Regulator prior to installation.

In order to comply with the UKWIR guidance, specific sampling and testing along the actual line of the proposed water supply route may need to be carried out once this has been established.

8.8 WASTE DISPOSAL

Excavated materials generated by the development may be considered as waste and subject to waste controls. Any re-use of excavated materials on-site should be undertaken in accordance with current waste and environmental legislation and which may require the production of an approved Materials Management Plan (MMP) prepared in accordance with the CL:AIRE Code of Practice.

It is recommended that a sustainable development strategy is adopted which reduces to a practicable minimum the generation of waste materials and the need for disposal to a licensed tip. Emphasis should be on recovery and re-use rather than disposal.

However, any waste or surplus materials that are generated will need to be classified in accordance with current EC regulations and Environment Agency guidance prior to disposal. It is the responsibility of the waste producer to classify the waste.

Based on the data obtained from the site investigation works, any waste materials comprising of the existing made ground are likely to be classified as non-hazardous/hazardous waste. The existing natural ground are likely to be classified as non-hazardous/inert.

Any asbestos containing materials (ACMs) will be classified as hazardous waste.

8.8 WASTE DISPOSAL (CONTINUED)

This classification is provisional and indicative of the likely waste classification based on the data obtained to date (including chemical composition, moisture content, etc.). It also assumes that the materials tested will be representative of future generated waste.

In order to minimise disposal, the materials generated should be segregated and examined, with appropriate testing as necessary, to enable the materials to be sorted or treated into lower classifications, with the resultant benefit of potentially generating re-use rather than disposal.

Once final waste sources and volumes are known, the waste stockpile to be disposed off-site will need to be classified in accordance with Environment Agency/Natural Resources Wales Waste Classification – Guidance on the Classification and Assessment of Waste Technical Guidance WM3 (2015). This is likely to require additional sampling and testing of the generated waste materials to provide an up to date current basis for classification.

Depending on the waste classification, waste acceptance criteria (WAC) testing may be required, in order to determine which class of landfill site the waste can be sent to.

It is recommended that the results of the waste classification and any WAC test results are sent to the intended licensed waste operator prior to disposal in order to confirm their classification and acceptance.

8.9 UNCERTAINTIES

It is important to recognise that there may be areas of contamination within the site that have not been found or that contaminants may be present at concentrations above those that have been found. It is also important to recognise that contamination may be localised and that no investigation, however comprehensive, is capable of finding such occurrences, other than by chance.

9.0 MINING RISK ASSESSMENT

9.1 BACKGROUND

The 1:10,560 scale geological map of the area (Sheet SO 00 SE) shows the site is underlain by rocks of the South Wales Middle Coal Measures of Carboniferous age. The rocks comprise of mudstone and siltstone with several productive coal seams. The map indicates that these strata dip in a southern direction in the area, with recorded dips of 10 degrees shown to the south of the site.

The map indicates the conjectural outcrops of five coal seams at or near the site. In the southern to central area of the site, outcrops of the Two Feet Nine, Four Feet, Upper Six Feet and Lower Six Feet are indicated to be present. The outcrops of the Nine Feet and Bute seams are indicated to be present in the vicinity of the site northern boundary.

The site is therefore likely to be underlain at shallow depths by all of the above named coal seams. The northernmost part of the site may also be underlain at shallow depths by the Yard and Seven Feet seams, which typically lie some 25 to 30m below the Nine Feet seam.

The generalised vertical section of the geological map shows that all these coal seams have potentially workable seam thickness, as follows:

<u>Coal Seam</u>	<u>Typical Seam Thickness (m)</u>
Two Feet Nine	0.75
Four Feet	1.80
Upper Six Feet	0.90
Lower Six Feet	1.20
Nine Feet	3.65
Bute	1.20
Yard	0.75
Seven Feet	1.20

Most of these seams are known to have been mined in the area and each of these seams is likely to underlie part of the site at shallow depths.

The geological map indicates that Alluvium superficial deposits overlie the rock strata in the north and east of the site, while Glacial Till deposits overlie the rock strata in the west of the site.

9.1 BACKGROUND (CONTINUED)

A Coal Authority Mining Report previously obtained indicates:

- The site is in the likely zone of influence from workings in 3 seams of coal at shallow to 140m depth, and last worked in 1950.
- The site is not in the likely zone of influence of any present underground coal workings.
- The Coal Authority states that within, or within 20m of the boundary of the site, there are seven mine entries. The following information was provided:
305204-038. This shaft was filled grouted and capped in 1975.
305204-030. Information provided to the Coal Authority by British Coal indicated this shaft is filled.
305204-069. No treatment details.
305204-036. This shaft was filled grouted and capped in 1975.
305204-031. This shaft was grouted and capped in 1977.
305204-060. Uncovered during road improvements, we understand this adit was treated by K Wardell and Partners Consultant Mining Engineers.
305204-037. This shaft was filled grouted and capped in 1975.
- The Authority is not aware of any evidence of damage arising due to geological faults or other lines of weakness that have been affected by coal mining.
- The site is not within the boundary of an opencast site from which coal has been removed by opencast methods.
- The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres, since 31st October 1994.
- There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The recorded workings at shallow to 140m depth are thought to be within the Seven Feet, Nine Feet and Four Feet coal seams.

Abandonment plans obtained from the Coal Authority that are included with then previous Coal Mining Risk Assessment undertaken by Intégral Géotechnique, indicate recorded workings in the Four Feet seam in the south of the site, the Nine Feet seam in the centre and southern areas and workings of the Seven Feet seam in the southern and central areas of the site.

There is therefore conclusive evidence to suggest that shallow coal mining has extensively taken place beneath the site and that mine shafts and adits are located on site associated with this activity.

9.2 FIELDWORK

A total of 19 rotary boreholes were drilled on site to profile the depth to rock head and identify the presence and nature of any shallow coal seams, or associated mining-related broken ground/voids.

The rotary open boreholes drilled by open hole method recorded rock head at depths of between 10.0m and 27.0m below existing ground level. In boreholes PH9, PH12, PH14, PH16 and PH19 bedrock was not encountered due to the thickness of the superficial deposits.

The rotary driller has described the solid strata as either a sequence of mudstone and/or sandstones.

Nine of the boreholes encountered one or more coal seams, with thicknesses typically ranging from 0.2m and 1.4m.

Across the site the following coal seams were encountered:

- PH1 at 17.0m to 18.4m;
- PH2 at 21.8m to 22.5m;
- PH3 at 19.7m to 21.1m;
- PH5 at 16.0 to 17.3m;
- PH10 at 19.7m to 21.0m;
- PH11 at 23.2m to 24.4m;
- PH13 at 16.7m to 19.7m;
- PH15 at 14.9 to 15.7m, 18.0m to 18.2m and 19.0m to 19.3m;
- PH17 at 21.0m to 21.8m.

One borehole, PH4 encountered evidence of old workings at depths of between 17.6m and 19.1m below existing ground level. Within borehole PH5, soft drilling conditions with poor returns was encountered directly below a coal seam at depths of between 17.3m and 18.1m below existing ground level.

Within borehole PH11, broken ground was noted within sandstone at depths of between 18.9m and 19.9m below existing ground level. As the broken ground is located within a sandstone block, it is likely to be associated with a fault or weakness in the sandstone.

The Coal Authority recorded one mine shaft and one mine adit within the site area. A further cluster of mine shafts and a mine adit are located off the south western boundary.

9.2 FIELDWORK (CONTINUED)

At the time of site investigation works, access to investigate the two mine entries located on site was unavailable. It is recommended that the mine entries located on site are investigated when access is available.

It is also recommended that the adit and shafts located off the south western site boundary of the site is also further investigated.

9.3 RISKS FROM MINING LEGACY

The previous desk study and coal mining risk assessment report coupled with the recent drilling works identified the following site-specific coal mining legacy risks to the site, see below Table 4.

Table 4 Mining Legacy Risk Table				
Coal Mining Issue	Yes	No	Risk Assessment	
			Rating	Comments
Underground coal mining (recorded at shallow depths)	X		High risk	Recorded workings and roadways presented on the Coal Authority mine abandonment plans, of the Four Feet Seam, Nine Feet Seam and Seven Feet Seam.
Underground coal mining (probable at shallow depths)	X		High risk	Recorded workings and roadways presented on the Coal Authority mine abandonment plans, of the Four Feet Seam, Nine Feet Seam and Seven Feet Seam. Workings also identified at within the south west/western area of the site.
Mine entries (shafts)	X		High risk	One shaft originally identified in the Coal Authority records. Shaft 305204-031 was grouted and capped in 1975. Investigation works to located the shaft have yet to be undertaken due to access constraints. Further mine shafts located on the south western boundary.

9.3 RISKS FROM MINING LEGACY

Coal Mining Issue	Yes	No	Risk Assessment	
			Rating	Comments
Mine entries (adits)	X		High risk	One adit originally identified in the Coal Authority records on site. Adit 305204-069, no treatment details are available. Investigation works to located the adit have yet to be undertaken due to access constraints. A further mine adit located off the south western boundary.
Coal mining geology (faults and fissures)		X	Low risk	None recorded
Record of past mine gas emissions or potential	X		Medium risk	All mine workings pose a potential gas risk which should be considered in any future investigations and development.
Recorded coal mining surface hazard		X	Low risk	None recorded
Surface mining (opencast workings)		X	Low risk	None recorded

A summary of the risk posed by these features is summarised below, along with comments on each specific coal mining issue.

9.4 RISKS FROM ABANDONED MINE WORKINGS

Coal mining at depths shallower than 30m beneath ground level can pose constraints to development in the form of ground stability at the surface. The magnitude of this effect depends upon the exact depth of any workings, the thickness of competent rock cover and the extraction thickness of any coal mine workings.

The drilling works undertaken has shown that shallow coal seams are located across the site with an area of shallow coal mining workings encountered in the south western and western area.

9.4 RISKS FROM ABANDONED MINE WORKINGS (CONTINUED)

To ensure that properties constructed over mine workings are not affected by subsidence associated with past mining, a rock head cover of ten times the maximum void depth of the workings is generally required.

Garrard and Taylor (1988) presented the results of a study of abandoned workings found at British opencast sites and concluded, by a combination of theoretical and empirical analysis, that the upper limit of migration was controlled by the formation of stable arches, not choking by bulked collapse debris. Height of migration was generally limited to less than $3W$, where W is the width of the void. It would be comforting if a deterministic upper bound to crownhole formation could be derived. However, there will be cases where no stable arch can form, e.g. in shattered or faulted zones with groundwater ingress and where no bulking occurs. Further, in these cases washing away of collapse debris by water moving through the mine, or by slipping to a greater depth down steeply inclined workings, may occur. The height of migration in these worst cases is indeterminate and could greatly exceed the limits derived from deterministic models. It follows that there is no 'safe limit', merely a decreasing probability of subsidence as cover to workings increases. In practice, for gently dipping strata in South Wales the effective upper bound of migration of crown holes appears to be in the range $6T$ to $8T$, where T is the height of the original void. However, in more than 75% of cases, the height of void migration was less than $2T$.

Drift deposits also appear to have a mitigating effect on the process. Very few examples of crown holing in South Wales have been found where the chimney has migrated up through more than 5.0m of drift cover.

Based on the above, the mining risk at the site can be divided into four areas, which are further indicated on Figure 3:

Area 1: South Western/Western area

Within the south western and western area of the site as shown on Figure 3, shallow coal seams including old workings were encountered during the drilling of the rotary boreholes.

The coal seams were encountered at depths of between 16m and 23.2m below existing ground level and typically at a thickness of 1.3/1.4m.

9.4 RISKS FROM ABANDONED MINE WORKINGS (CONTINUED)

Evidence of mine workings were encountered within one borehole (PH4) at a depth of 17.9m below existing ground level, within a recorded thickness of 1.6m. Within borehole PH5, soft drill conditions with poor returns were noted below an intact coal seam at a depth of 17.3m below existing ground level.

These coal seams and mine workings noted above are thought to be associated with the Four Feet Seam.

Abandonment plans obtained from the Coal Authority, that were included within the Intégral Géotechnique Coal Mining Risk Assessment, show the workings of the Four Feet Seam below the western and south western area of the site. These abandonment plans indicated that these workings of the Four Feet were located at a depth of 20m.

The abandonment plans for the Four Feet seam also indicate a sudden stopping of the workings and no further advancement of the workings below the remaining site area. This indicates that a possible fault or faults run below the site and prevented further advancement of mine workings of the Four Feet Seam.

Within the area, rockhead was encountered at depths of between 10.2m and 16.8m. Based on the 10:1 ratio for the thickness of rock cover to void height required to prevent potential subsidence migrating up from workings to the surface as previously discussed, and based on the 1.6m thick workings encountered within the borehole, a minimum 16m of rock cover would be required above the recorded workings.

Therefore, based on the site investigation works undertaken to date, there is insufficient rock cover.

Further to the above, the Coal Authority Abandonment Plans indicate that there are associated roadways recorded below the area which potentially, may be wider or taller than the workings, and therefore a greater thickness in rock cover would be required.

Given the presence of shallow coal seams, shallow coal mine workings and insufficient rock cover identified, it is recommended that a plot specific proof drilling and based upon these results, a plot specific drilling and grouting exercise, is completed across the area to stabilise the mine workings identified.

9.4 RISKS FROM ABANDONED MINE WORKINGS (CONTINUED)

Area 2: Northern area

Within the northern area, shallow coal seams were encountered within the boreholes at depths of between 14.9m and 21m below existing ground level. These seams were encountered as intact and either considered of a seam at a typical thickness 0.8m/1.2m or a series of thinner seams at a typical thickness of 0.2/0.3m.

These seams are possibly associated with the Six Feet seams, that are thought to underlie the northern and central areas of the site at shallow depths. The Coal Authority has no records of workings within the Six Feet seams. However, the coal seams encountered in the northern area of the site are of a workable thickness and located at shallow depths and therefore there may be unrecorded shallow workings located in this area.

It is recommended that further rotary open boreholes are drilled in the northern area of the site to provide a further understanding of the depth to rock head, the presence of shallow seams and any associated workings.

The Coal Mining Risk Assessment previously undertaken by Intégral Géotechnique identified that the Nine Feet Seam and Seven Feet Seam may underlie the northern site area at shallow depths and therefore there is the possibility of shallow unrecorded workings.

The Nine Feet seam and the underlying Seven Feet seam were not encountered within the 30m depth of the boreholes in the northern site area. This indicates that the Nine Feet seam and the Seven Feet seam do not underlie the site within shallow depths.

The Coal Authority abandonment plans indicated recorded workings of the Nine Feet and Seven Feet seams in the central and southern area and these are further discussed below.

Area 3: Eastern area

In the eastern area of the site, as shown on Figure 3, the boreholes did not encounter any coal seams or mine workings within the 30m depth of the surface.

Further to the above the majority of the boreholes in the area did not encounter the base of the superficial deposits and therefore rockhead was not encountered. Where rockhead was encountered in the western part of this area, it was recorded at depths of between 23.4 and 27m.

9.4 RISKS FROM ABANDONED MINE WORKINGS (CONTINUED)

It is considered that the thickness of the superficial deposits encountered within the boreholes would prevent the migration of voids up to the surface level.

Based on the above, the risk of ground subsidence occurring as a result of past shallow mine workings is considered to be low and no further works are required in the eastern site area as indicated on Figure 3.

Area 4: Southern area

Access in the southern area of the site was limited at the time of the site investigation works due the ongoing demolition works.

The boreholes drilled within the area, encountered coal seams at depths of between 19.7m and 21.8m below existing ground level, with typical seam depths if 0.7m/1.4m. The coal seams were encountered as intact. Rockhead was encountered at depths of between 16.9m and 17.8m.

As previously stated, the Nine Feet seam and Seven Feet seam were historically mined in the central and southern area of the site. The Coal Authority abandonment plans indicated that the Nine Feet seam recorded mine workings were typically at a depth of 76m below the site and the recorded workings of the Seven Feet seam at typically depths of 122m below ground level. At these depths the mine workings do not pose a risk to the proposed development.

The Two Feet Nine Seam is also suspected to outcrop in the southern area of the site. However, although recorded workings in the Two Feet Nine seam are indicated on the Coal Authority abandoned plans for the Four Feet Seam, no Two Feet Nine seam workings are indicated to be present below the site.

Further to the above, previous site investigations undertaken by Intégral Géotechnique to the south of the site, indicated that the Two Feet Nine seam is likely to outcrop further south than indicated on the geological map, possibly beneath the southern tip of the site.

However, there could be further unrecorded workings of the Four Feet Seam located in the southern area of the site. Therefore, due to the access constraints at the time of the site investigation resulting in limited information and the potential for unrecorded shallow mine workings, it is recommended that further rotary open boreholes are drilled on site to provide a further understanding of the depth to rock head, the presence of shallow seams and any associated unrecorded mine workings.

9.5 RISKS FROM ABANDONED MINE ENTRIES

The presence of the mine entries recorded by the Coal Authority may have the potential to cause localised instability.

Until recently, mine entries were rarely treated on abandonment to any significant engineering standard. They were typically loosely backfilled, or inferior capping was constructed over them. With time, backfills may settle and caps fail, resulting in significant ground loss. Therefore, if a mine entry lies partially or wholly within the site, or within a 20m buffer zone, drawn outside the site boundary, then its potential effect should be considered in the site development.

Within the western and south western site area, mine entries have been recorded on site. When access is available these mine entries should be located and further investigated. According to the Coal Authority record shaft 305204-031 was grouted and capped in 1975. The mine adit 305204-069 has no treatment details and is also not noted on historical maps or abandonment plans which indicates it pre-dates 1880s.

The Coal Authority records also indicates a cluster on mine shafts located on the south western site boundary. One off these mine shafts may encroach into the site. Further investigation is required to locate the mine shaft that is possibly located in the south west of the site when access is available.

The approximate location of the mine entries based on the Coal Authority Plans are shown on Figure 2.

A further mine adit (305204-060) is located off the south western site boundary within the cluster of the mine shafts. Coal Authority records indicates this mine adit was treated by K Wardell and Partners Consultant Mining Engineers during road improvement works.

Provisions should be made during the recommended reclamation works to deal with any roadways associated with the above mine adit, if they are found to encroach into the site.

The development site lies within a historical mining area and therefore there is a residual risk of unrecorded mine entries to be present on site. All site operatives should be made aware of this potential risk and a watching brief should be maintained during site works.

9.6 COAL MINING GEOLOGY (FAULTS AND FISSURES)

No known fissures or break lines are known to affect the development site.

No seam mentioned in this report is recorded as being prone to spontaneous combustion.

9.7 RECORD OF PAST OR POTENTIAL MINE GAS EMISSIONS

There are no past gas emissions recorded in the surrounding area. It should be noted that coal seams and coal mine workings pose a potential gas risk which should be considered.

At development sites with shallow coal workings, probable shallow coal mine workings, or pathway features such as mine entries and geological disturbance on or nearby the site, the Coal Authority recommends that a gas risk assessment is undertaken.

Within six of the rotary boreholes, monitoring wells were installed within the made ground to monitor the concentrations of ground gas.

The ground gas monitoring is ongoing and the first round recorded a maximum methane concentration of 0.5% and a maximum carbon dioxide concentration of 2.1%. A maximum gas flow rate of 0.3l/hr was measured during the gas monitoring programme.

9.8 RECORDED COAL MINING SURFACE HAZARD

None recorded

9.9 SURFACE MINING (OPENCAST WORKINGS)

None recorded

9.10 DEVELOPMENT RISK PLAN

Based on the site investigation works to date, the western and south western area is underlain by underground mine workings. It is proposed that a proof drilling and grouting stabilisation works are undertaken across the area.

Further rotary boreholes are required in the northern and southern area to confirm the potential risk from underground mine workings.

The eastern area is deemed to be at a low risk from subsidence from recorded or unrecorded mine workings.

The mine entries located on site and clustered along the south western boundary of the site present a risk and require further investigation works when access is available.

9.10 DEVELOPMENT RISK PLAN

In addition, all foundations and floor slabs of the proposed buildings across the site should be reinforced such that they capable of spanning potential voids of up to 3m diameter, with cantilever effects of 1.5m at the edges.

9.11 DEVELOPMENT PRECAUTIONS

Site investigation and/or remediation

Due to the presence of mine workings at shallow depths of the Four Feet seam in the western and south western area of the site, a plot specific drilling and grouting stabilisation works should be undertaken.

In addition, it is recommended that further rotary open boreholes are undertaken in the northern and southern site area to confirm the ground conditions and the risk of ground subsidence from mine workings.

The mine entries located on site will require locating and investigated to confirm their location and current state.

The occurrence of unrecorded mine entries across the site cannot be discounted and consequently a watching brief should be maintained throughout the site works to identify this risk. As a result, all site operatives should be made aware of this potential risk.

Coal Authority Permit

Any intrusive activities, including site investigation boreholes and any subsequent treatment of coal mine workings/coal mine entries for ground stability purposes require written permission of the Coal Authority.

10.0 ENGINEERING CONSIDERATIONS AND RECOMMENDATIONS

10.1 DETAILS OF PROPOSED DEVELOPMENT

The proposed development will comprise the construction of a number of residential dwellings, the exact layout of which has not been made available to us. The development is also likely to include associated infrastructure such as access roads, car parking areas, areas of landscaping and private gardens.

10.2 SITE PREPARATION

In order to provide a suitable level plateau for development and to minimise settlement within the bearing area of the foundations of the proposed structures, roads, drainage and services, reclamation works are required.

Prior to works commencing on site, any services within the site area should be identified and either diverted or protected. Any diversion works should be carried out undertaken the supervision of, and to the specification of, the appropriate statutory authorities. The resulting excavations should be backfilled with suitable granular material.

Prior to works commencing on site, it is recommended that a survey of invasive or pest plants is undertaken. Any pest plants identified should be subject to an eradication programme. Existing vegetation should be stripped prior to commencing any site works.

Any fly tipped materials should be removed from the site to licenced tips.

As discussed in Section 9, based on the current site works the south western/western area of the site are considered to be at risk from a legacy of shallow mining activities. Drilling and grouting works are recommended beneath the proposed buildings and possibly beneath the roads/main infrastructure corridors and any potential proposed attenuation tanks. Depending on the outcome of the further recommended boreholes, additional areas across the site might require drilling and grouting works.

When access is available, it is recommended that the known mine entries located on site are exposed and inspected. The location of the mine entries located on site and along the south western boundary will need to be considered within the finalised site layout, with the appropriate no development exclusion zone located around each mine entry.

10.2 SITE PREPARATION (CONTINUED)

It is recommended that the suspected culvert crossing the site, should be investigated to confirm its location, depth and to confirm if it is live. Allowances should be made for possible diversion works.

A strategy should be agreed in order to identify and deal with any contamination, including asbestos cement materials, which are currently stockpiled on site. A system should be established to ensure any encountered contamination is reported to the site engineer and the appropriate action taken.

It is recommended that when access is available, that the areas below the former tanks are investigated, sampled and tested for any residual hydrocarbon contamination.

During site clearance and subsequent operations, any airborne nuisance caused by dust from the site, must be controlled for the health and safety of the site operatives and the general public.

It is recommended that the made ground across the site should be excavated to a depth of 2m below the underside of proposed foundation, or to natural ground if encountered at shallow depths. Any remnant foundations, structures etc associated with the former factory should be removed. Locally, the excavations will need to be deepened in order to remove/chase out deeper structures.

Consideration should be given to the clearance of deeper zones in order to accommodate the planned infrastructure drainage.

Careful and strategic management of the available materials will be required to ensure the earthworks are cost effective and efficient.

The excavated materials should be sorted and processed, in accordance with an agreed Outline Remediation Strategy and Materials Management Plan. The removed concrete slab and foundations and suitable demolition materials should be separated from the bulk excavation materials crushed to a suitable grade, and stockpiled on site for future re-use as granular fill material. A detailed crushing strategy should be produced prior to the commencement of works so to maximise the re-use of materials on site. The remaining bulk excavation materials should be processed and any unacceptable materials, such as timber and metals, removed. The acceptable materials should be stockpiled on site for compliance testing and future re-use. Any potential contaminated soils should be segregated into separate covered stockpiles for testing.

10.2 SITE PREPARATION (CONTINUED)

The reduced formation should be proof rolled until soft spots are removed and brought up to a uniform level, typically 2m below the underside of proposed slab level. In parts of the site where soft or loose materials are present or in areas of thicker made ground, Landpac dynamic compaction or a similar approved technique should be used to compact the reduced formation to a uniform standard, prior to raising site levels to the required level.

Upon completion of the compaction works, the reduced formation should be brought back up to the required level with acceptable excavated materials. These should be placed in well compacted layers, in accordance with DTp Specifications as described above. The water content of materials will be critical for the successful placement of the re-engineered fill. Stockpiles of selected material should be sealed and reduced level formations protected from weathering.

It is recommended that geotechnical laboratory testing, including compaction testing and optimum moisture contents are undertaken to provide characteristics of made ground.

It is recommended that the placement of the re-engineered materials is supervised and validated by a qualified geotechnical engineer. Validation testing, chemical and physical (typically plate load tests and dynamic probing) should be carried out across the completed prepared plateau in order to ensure its performance.

In the northern area, the site surface was often water logged and boggy. During the reclamation works it will be necessary to investigate suitable surface and groundwater control measures.

Temporary surface water management lagoons are required in order to ensure that transport of sediment into existing water courses and over existing site boundaries is minimised.

A phased validation/verification report will be required upon completion of the site works in order to satisfy the requirements of the local planning authority, Natural Resources Wales and the NHBC.

Upon completion of the construction works, all garden and landscaped areas are to be capped by a minimum thickness of 600mm of clean subsoil and topsoil laid over an anti-mixing membrane.

10.3 FOUNDATIONS AND FLOOR SLABS

As discussed in Section 9, based on the current site investigation works, evidence of shallow coal seams and shallow mine workings including mine entries are located in the south western/western area of the site, as indicated in Section 9.

Therefore, based on the current investigation, wherever there is considered to be a risk of very shallow working, i.e in the area included on Figure 3, a programme of systematic drilling and grounding works is recommended in order to stabilise the ground beneath the proposed buildings and possibly also underneath the roads and main infrastructure (including any proposed attenuation tanks should these be required).

Further investigation, consisting of boreholes is required in the southern and northern areas of the site to confirm and provide a greater understanding of the presence of shallow coal seams and any associated workings.

For 2 and 3 storey residential development, given the risks of very shallow mine workings, mine entries and shallow disturbed ground caused by mining-related ground subsidence, it is recommended that the proposed development is founded using reinforced raft foundations founded within well compacted re-engineered made ground, capable of spanning 3m, with a cantilever effect of 1.5m at the corners.

An allowable bearing pressure of 50kN/m² can be used for design purposes. At this intensity of loading, the total settlement should not exceed 25mm with angular distortions caused by differential movement should be less than 1:750.

All foundations formations should be inspected by a qualified engineer before being concreted.

If apartment blocks are planned, further detailed consideration of foundation types will be required.

10.4 EXCAVATIONS AND FORMATIONS

Most of the excavations to the represented depths of the trial pits should be possible with normal soil excavating machinery. However, allowances should be made for the use of pneumatic breakers attachments, or similar tools, if any remnant foundations or buried structures are encountered.

10.4 EXCAVATIONS AND FORMATIONS (CONTINUED)

Excavations to depths of typically 2m are unlikely to encounter significant groundwater inflows. However, groundwater flows and/or seepages are likely to be encountered in the northern area of the site within the area of water logged/boggy ground. Due to the nature of the made ground, pockets of perched groundwater may be locally encountered.

During excavations, it is considered that any groundwater inflows together with rainfall infiltrations could be controlled by using conventional pumping techniques to sumps.

The sides of excavations deeper than 1.0m should be supported by trench boxes, or temporarily battered at gradients of typically 30°.

10.5 ACCESS ROADS AND CAR PARKING AREAS

For access roads and car parking formations within the post site clearance, reclaimed made ground, California Bearing Ratio (CBR) values of 5% should be achievable and could be used for design purposes.

It will be necessary to ensure this performance and hence contingencies should be allowed for the removal of any 'soft spots/areas' and their replacement with well compacted imported granular materials, laid in well compacted layers in accordance with DTp Specifications for Highway Works. All formations should be proof rolled and inspected to ensure removal of obstructions that could potentially form hard spots.

10.6 DRAINAGE

Due to the nature of the made ground, presence of elevated concentrations of contaminants within the made ground and the proposed re-engineering of materials soakaways are not recommended on site.

10.7 RECOMMENDED FURTHER WORKS

The following further works are recommended:

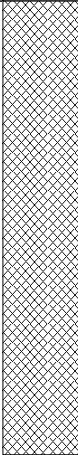
- Plot specific drilling and grouting in the western and south western area of the site.
- Further rotary open boreholes in the northern and southern area of the site to confirm the depth to rockhead, and the presence of shallow coal seams and any unrecorded mine workings.
- Further investigation to confirm the location of the mine entries located on site and to confirm their current state.

10.7 RECOMMENDED FURTHER WORKS (CONTINUED)

- The drilling of cable percussion boreholes across the site to confirm the geotechnical properties of the underlying superficial deposits.
- Further investigation below and within the area of the former above ground storage tanks including sampling, laboratory testing of contamination and risk assessment.
- Sampling and testing of the made ground for potential leachable contaminants to undertake a groundwater risk assessment.

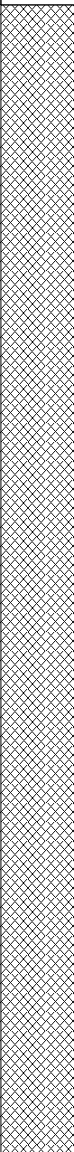
APPENDIX A

TRIAL PIT LOGS

Intégral Géotechnique Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com			Project Name: Dragon Parc			Project No.: 12392		Trial Pit No.: TP01 Sheet 1 of 1	
Location: Merthyr Tydfil			Client: Huntley Wood Investments			Logged By: LW		Scale 1:25	
Equipment: JCB 3CX			Coordinates: 305357.00mE - 204408.00mN			Dimensions 2.80m Depth : 1.50m 0.70m			
Date Excavated: 27/03/2019			Level: 160.00mAOD						
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
1.50	ES		1.50	158.50		Made Ground: Vegetation onto loose grey black sandy silty gravel. Gravel is fine to coarse angular of colliery spoil, ash, siltstone, mudstone, concrete with metal sheeting and fragments. Siltstone cobbles and rare boulders. Rare concrete boulder. End of Trialpit at 1.50 m			
Remarks:			Groundwater:			Quick inflow of water from ground level		Key:	
1. Trial pit terminated at 1.5m due to water inflow. 2. Trial pit undertaken in boggy/saturated ground.			Stability:			Relatively stable		D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample	
									

 Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com			Project Name: Dragon Parc			Project No.: 12392		Trial Pit No.: TP02 Sheet 1 of 1	
Location: Merthyr Tydfil			Client: Huntley Wood Investments			Logged By: LW		Scale 1:25	
Equipment: JCB 3CX			Coordinates: 305401.00mE - 204470.00mN			Dimensions 3.20m			
Date Excavated: 27/03/2019			Level: 158.00mAOD			Depth : 3.00m 0.70m			
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
0.50	ES					Made Ground: Vegetation onto loose, loose to medium dense grey black slightly clayey sandy silty gravel. Gravel is fine to coarse angular to subangular of brick, concrete, siltstone, mudstone, colliery spoil, ash, locally very ash, some coal fragments and some fragments of metal, ceramic and plastic. Frequent brick and siltstone cobbles, occasional boulders. ... frequent slag materials between 2m and 3m - hard dig conditions.			
			3.00	155.00		End of Trialpit at 3.00 m			
Remarks: 1. Terminated at 3.0m due to slow progress/hard dig conditions.			Groundwater: Groundwater not encountered Stability: Relatively stable			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			

 Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com			Project Name: Dragon Parc			Project No.: 12392		Trial Pit No.: TP03 Sheet 1 of 1	
Location: Merthyr Tydfil			Client: Huntley Wood Investments			Logged By: LW		Scale 1:25	
Equipment: JCB 3CX			Coordinates: 305430.00mE - 204425.00mN			Dimensions 3.80m			
Date Excavated: 27/03/2019			Level: 159.00mAOD			Depth : 3.80m 0.80m			
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
0.70	ES					Made Ground: Vegetation/grass onto loose, loose to medium dense grey black clayey silty sandy gravel. Gravel is fine to coarse angular to subangular of colliery spoil, mudstone, siltstone, concrete, ash, very rare coal fragments and fragments of ceramics, metal, timber and wires. Cobbles and some boulders of siltstone and mudstone. Hydrocarbon odour. Localised clay bands throughout. ... hard dig conditions below 1.5m. ... frequent siltstone cobbles below 2.4m. ... very sandy between 2.7m and 3.5m with glass bottles and glass fragments.			
			3.80	155.20		End of Trialpit at 3.80 m			
Remarks: 1. Trial pit terminated at 3.8m bgl at maximum reach of excavator.			Groundwater: Groundwater not encountered Stability: Relatively stable			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			

Intégral Géotechnique Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com			Project Name: Dragon Parc			Project No.: 12392		Trial Pit No.: TP04 Sheet 1 of 1	
Location: Merthyr Tydfil			Client: Huntley Wood Investments			Logged By: LW		Scale 1:25	
Equipment: JCB 3CX			Coordinates: 305474.00mE - 204418.00mN			Dimensions 3.50m			
Date Excavated: 27/03/2019			Level: 158.00mAOD			Depth : 3.80m 0.80m			
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
3.80	ES		3.80	154.20		Made Ground: Grass onto loose to medium dense, medium dense, brown grey black slightly clayey to clayey silty sandy gravel. Gravel is fine to coarse angular to subangular of colliery spoil, ash, bricks, some concrete, siltstone, mudstone, rare to some slag materials and rare coal fragments. Cobbles of brick, siltstone and mudstone. Very clayey bands and lenses throughout. ... frequent siltstone and mudstone below 2.9m.			
						End of Trialpit at 3.80 m			
Remarks: 1. Trial pit terminated at 3.8m bgl. at maximum reach of excavator						Groundwater: Groundwater not encountered		Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample	
						Stability: Minor spalling			

Intégral Géotechnique Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com			Project Name: Dragon Parc			Project No.: 12392		Trial Pit No.: TP05 Sheet 1 of 1	
Location: Merthyr Tydfil			Client: Huntley Wood Investments			Logged By: LW		Scale 1:25	
Equipment: JCB 3CX			Coordinates: 305437.00mE - 204355.00mN			Dimensions 3.20m			
Date Excavated: 27/03/2019			Level: 157.00mAOD			Depth : 3.00m 0.80m			
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
						Made Ground: Grass onto loose to medium dense, medium dense grey black clayey silty sandy gravel. Gravel is fine to coarse angular to subangular of colliery spoil, siltstone, mudstone, ash, brick, iron stained siltstone, rare coal fragments. Cobbles of concrete, brick and siltstone with some boulders. .. Slow dig conditions throughout ... Frequent siltstone cobbles and boulders below 2.0m. End of Trialpit at 3.00 m			
			3.00	154.00					
Remarks:			Groundwater: Wet/damp			Key:			
1. Trial pit terminated at 3.0m bgl due to spalling of pit sides.			Stability: Spalling of pit sides			D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			
						AGS			

 Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com			Project Name: Dragon Parc			Project No.: 12392		Trial Pit No.: TP06 Sheet 1 of 1	
Location: Merthyr Tydfil			Client: Huntley Wood Investments			Logged By: LW		Scale 1:25	
Equipment: JCB 3CX			Coordinates: 305389.00mE - 204332.00mN			Dimensions 3.20m			
Date Excavated: 27/03/2019			Level: 154.00mAOD			Depth : 3.50m 0.80m			
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
0.40	ES		0.30	153.70		Made Ground: Crushed concrete/sub base			
						Made Ground: Loose, loose to medium dense slightly clayey silty sandy gravel. Gravel is fine to coarse angular to subangular of colliery spoil, ash, siltstone, brick, iron stained siltstone, clinker, rare coal fragments. Cobbles and some boulders of mudstone and siltstone. ... Slow dig conditions throughout.			
									
									
									
			2.50	151.50		Soft, possible locally soft to firm brown slightly sandy slightly gravelly silty CLAY to SILT/CLAY. Gravel is fine to coarse subangular to subrounded of siltstone and sandstone, with rare siltstone cobbles.			
			3.00	151.00		Loose to medium dense grey brown clayey silty very sandy GRAVEL with cobbles. Gravel is fine to coarse subangular to subrounded of siltstone and sandstone.			
			3.50	150.50		End of Trialpit at 3.50 m			
Remarks: 1. Trial pit terminated at 3.5m bgl.			Groundwater: Groundwater not encountered.			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			
			Stability: Minor spalling of made ground.						

 Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com			Project Name: Dragon Parc			Project No.: 12392		Trial Pit No.: TP07 Sheet 1 of 1	
Location: Merthyr Tydfil			Client: Huntley Wood Investments			Logged By: LW		Scale 1:25	
Equipment: JCB 3CX			Coordinates: 305403.00mE - 204316.00mN			Dimensions 3.50m			
Date Excavated: 27/03/2019			Level: 154.00mAOD			Depth : 3.70m 0.70m			
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
0.40	ES		0.30	153.70		Made Ground: Crushed concrete/sub base			
						Made Ground: Loose to medium dense grey black clayey, locally very clayey sandy gravel. Gravel is fine to coarse angular to subangular of colliery spoil, ash, clinker, coal fragments, siltstone, mudstone, brick, some concrete and fragments of ceramics, timber and metals. Rare buried tree remains. Cobbles and some boulders of brick, concrete and siltstone. ... frequent iron stained siltstone with cobbles below 2.3m. ... some coal fragments below 2.5m. ... frequent tabular cobbles of mudstone and siltstone below 2.8m. ... slow progress throughout.			
			3.70	150.30		End of Trialpit at 3.70 m			
Remarks: 1. Trial pit terminated at 3.7m at maximum reach of excavator			Groundwater: Seepage at 1.0m.			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			
			Stability: Spalling due cobbles and boulders removal.						

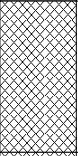
 Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com			Project Name: Dragon Parc			Project No.: 12392		Trial Pit No.: TP08 Sheet 1 of 1	
Location: Merthyr Tydfil			Client: Huntley Wood Investments			Logged By: LW		Scale 1:25	
Equipment: JCB 3CX			Coordinates: 305466.00mE - 204330.00mN			Dimensions 3.20m			
Date Excavated: 27/03/2019			Level: 156.00mAOD			Depth : 2.50m 0.80m			
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
			0.30	155.70		Made Ground: Crushed concrete/sub base Made Ground: Loose, loose to medium dense grey black clayey silty sandy gravel. Gravel is fine to coarse angular to subangular of colliery spoil, clinker, ash, rare to some coal fragments, concrete, brick, siltstone and mudstone. Frequent siltstone and mudstone cobbles. Slow progress upon contact with boulders. ... frequent large boulders at 1.0m.			
			2.50	153.50		End of Trialpit at 2.50 m			
Remarks: 1. Trial pit terminated at 2.5m bgl due to slow progress			Groundwater: Groundwater not encountered Stability: Unstable pit sides			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			

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Location: Merthyr Tydfil			Client: Huntley Wood Investments			Logged By: LW		Scale 1:25	
Equipment: JCB 3CX			Coordinates: 305510.00mE - 204312.00mN			Dimensions 3.50m			
Date Excavated: 27/03/2019			Level: 156.00mAOD			Depth : 3.50m 0.80m			
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
0.50	ES					Made Ground: Loose to medium dense grey black clayey silty sandy gravel. Gravel is fine to coarse angular to subangular of colliery spoil, siltstone, mudstone, brick, rare coal fragments, clinker and iron stained siltstone. Cobbles of brick and siltstone. .. frequent siltstone cobbles and some boulders below 2m, with possible rare slag materials.			
			3.50	152.50		End of Trialpit at 3.50 m			
Remarks: 1. Trial pit terminated at 3.5m bgl at maximum reach of excavator.			Groundwater: Damp/wet Stability: Spalling due to cobbles and boulder removal.			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			

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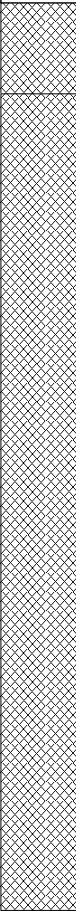
 Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com			Project Name: Dragon Parc			Project No.: 12392		Trial Pit No.: TP11 Sheet 1 of 1	
Location: Merthyr Tydfil			Client: Huntley Wood Investments			Logged By: LW		Scale 1:25	
Equipment: JCB 3CX			Coordinates: 305433.00mE - 204224.00mN			Dimensions 3.50m			
Date Excavated: 28/03/2019			Level: 155.00mAOD			Depth : 3.50m 0.80m			
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
0.50	ES					Made Ground: Loose, loose to medium dense black locally grey black clayey, locally very clayey silty sandy gravel. Gravel is fine to coarse angular to subangular of colliery spoil, ash, clinker, mudstone, siltstone, coal fragments, rare slag material and fragments of metal and plastic. Frequent cobbles and some boulders of siltstone and mudstone. Rare concrete cobbles. ... Foundation in pit side at 0.5m to 1.0m. ... band of slag material between 2.7m and 2.9m.			
			3.50	151.50		End of Trialpit at 3.50 m			
Remarks: 1. Trial pit terminated at 3.5m bgl.			Groundwater: Groundwater not encountered Stability: Relatively stable			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			

 Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com			Project Name: Dragon Parc			Project No.: 12392		Trial Pit No.: TP12 Sheet 1 of 1	
Location: Merthyr Tydfil			Client: Huntley Wood Investments			Logged By: LW		Scale 1:25	
Equipment: JCB 3CX			Coordinates: 305440.00mE - 204178.00mN			Dimensions 3.20m			
Date Excavated: 28/03/2019			Level: 156.00mAOD			Depth : 2.50m 0.80m			
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
						Made Ground: Loose, loose to medium dense grey black clayey silty sandy gravel. Gravel is fine to coarse angular to subangular of colliery spoil, siltstone, mudstone, clinker, ash, rare coal fragments, with rare ceramic fragments. Cobbles and some boulders of concrete and siltstone. ... slow progress upon boulders. ... concrete obstruction at 1.4m			
			2.00	154.00		Soft grey brown sandy slightly gravelly to gravelly clayey SILT to silty SAND. Gravel is fine to coarse angular to subrounded of siltstone, sandstone with cobbles.			
			2.50	153.50		End of Trialpit at 2.50 m			
Remarks: 1. Trial pit terminated at 2.5m due to unstable pit sides.			Groundwater: Damp/wet Stability: Unstable pit sides			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			

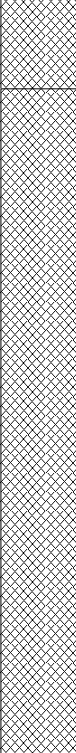
 Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com			Project Name: Dragon Parc			Project No.: 12392		Trial Pit No.: TP13 Sheet 1 of 1	
Location: Merthyr Tydfil			Client: Huntley Wood Investments			Logged By: LW		Scale 1:25	
Equipment: JCB 3CX			Coordinates: 305451.00mE - 204114.00mN			Dimensions 3.20m			
Date Excavated: 28/03/2019			Level: 157.00mAOD			Depth : 2.60m 0.70m			
Samples & In-situ Testing			Stratum Description						
Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend				
			0.50	156.50		Made Ground: Loose brown grey black sandy gravel. Gravel is fine to coarse angular of demolition rubble, aggregate and brick.			
						Made Ground: Loose, loose to medium dense grey black very clayey silty sandy gravel. Gravel is fine to coarse angular to subangular of colliery spoil, siltstone, mudstone, ash, iron stained siltstone, clinker and some brick. Frequent cobbles and some boulders of siltstone and mudstone.			
						... concrete obstruction in pit side from 0.3m to 0.5m, with clay pipes below.			
						... rare coal fragments and possible slag material below 2.0m			
						... slow progress due to cobbles and boulders below 2.4m.			
			2.60	154.40		End of Trialpit at 2.60 m			
Remarks: 1. Trial pit terminated at 2.6m due to slow progress on boulders and cobbles.			Groundwater: Wet below 2.0m			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			
			Stability: Relatively stable						

 Integral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com			Project Name: Dragon Parc			Project No.: 12392		Trial Pit No.: TP14 Sheet 1 of 1	
Location: Merthyr Tydfil			Client: Huntley Wood Investments			Logged By: LW		Scale 1:25	
Equipment: JCB 3CX			Coordinates: 305490.00mE - 204137.00mN			Dimensions 3.40m			
Date Excavated: 28/03/2019			Level: 155.00mAOD			Depth : 2.10m 0.70m			
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
0.30	ES					Made Ground: Loose, loose to medium dense grey black clayey silty sandy gravel. Gravel is fine to coarse angular to subangular of colliery spoil, ash, clinker, siltstone, mudstone, rare brick fragments and very rare slag material. Some to frequent cobbles of siltstone and mudstone. ...locally very sandy layers.			
			2.10	152.90		End of Trialpit at 2.10 m			
Remarks: 1. Trial pit terminated at 2.1m due to collapse of pits sides			Groundwater: Groundwater not encountered Stability: Collapse of pit sides			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			

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 Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com			Project Name: Dragon Parc			Project No.: 12392		Trial Pit No.: TP16 Sheet 1 of 1	
Location: Merthyr Tydfil			Client: Huntley Wood Investments			Logged By: LW		Scale 1:25	
Equipment: JCB 3CX			Coordinates: 305521.00mE - 204218.00mN			Dimensions 3.20m			
Date Excavated: 28/03/2019			Level: 156.00mAOD			Depth : 3.00m 0.70m			
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
0.50	ES		0.30	155.70		Made Ground: Loose crushed concrete			
				Made Ground: Loose, loose to medium dense grey black clayey silty sandy gravel. Gravel is fine to coarse angular to subangular of colliery spoil, clinker, brick fragments, siltstone, mudstone and very rare coal fragments. Frequent cobbles of mudstone and siltstone.					
			3.00	153.00		End of Trialpit at 3.00 m			
Remarks: 1. Trial pit terminated at 3.0m due to spalling of pit sides.			Groundwater: Groundwater not encountered.			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			
			Stability: Spalling of pit sides						

Intégral Géotechnique Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com			Project Name: Dragon Parc			Project No.: 12392		Trial Pit No.: TP17 Sheet 1 of 1	
Location: Merthyr Tydfil			Client: Huntley Wood Investments			Logged By: LW		Scale 1:25	
Equipment: JCB 3CX			Coordinates: 305499.00mE - 204264.00mN			Dimensions 3.40m			
Date Excavated: 28/03/2019			Level: 155.00mAOD			Depth : 2.50m		0.80m	
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
			0.50	154.50		Made Ground: Crushed concrete and demolition rubble			
						Made Ground: Loose, loose to medium dense grey black clayey silty sandy gravel. Gravel is fine to coarse angular to subangular of colliery spoil, ash, clinker, coal fragments, siltstone, mudstone with cobbles and boulders of siltstone at base.			
			2.50	152.50		End of Trialpit at 2.50 m			
Remarks:			Groundwater:			Groundwater not encountered		Key:	
1. Trial pit terminated at 2.5m bgl due to slow progress on cobbles and boulders.			Stability:			Minor spalling		D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample	

 Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com			Project Name: Dragon Parc			Project No.: 12392		Trial Pit No.: TP18 Sheet 1 of 1	
Location: Merthyr Tydfil			Client: Huntley Wood Investments			Logged By: LW		Scale 1:25	
Equipment: JCB 3CX			Coordinates: 305482.00mE - 204227.00mN			Dimensions 3.20m			
Date Excavated: 28/03/2019			Level: 156.00mAOD			Depth : 2.50m 0.70m			
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description			
Depth (m)	Type	Results							
0.50	ES		0.30	155.70		Made Ground: Crushed concrete and demolition rubble.			
				Made Ground: Loose, loose to medium dense grey black clayey silty sandy gravel. Gravel is fine to coarse angular to subangular of siltstone, mudstone, colliery spoil, clinker, rare to some coal fragments. Some siltstone cobbles and some boulders.					
						... concrete obstruction at 1.1m			
			2.50	153.50		End of Trialpit at 2.50 m			
Remarks: 1. Trial pit terminated at 2.5m due to slow progress in boulders.			Groundwater: Wet/damp			Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample			
			Stability: Spalling of pit sides						

[illegible]

APPENDIX B

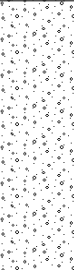
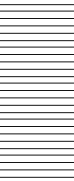
ROTARY BOREHOLES LOGS

		Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com		Project Name: Dragon Parc				Project No.: 12392		Borehole No.: PH1 Sheet 1 of 1	
Location: Merthyr Tydfil				Client: Huntley Wood Investments				Coordinates: 305481.00mE 204058.00mN		Hole Type: RO	
Equipment: Klemm 802				Diameter of Casing: 150mm				Level: 153.00mAOD		Scale 1:200	
Diameter of Boring: 142mm				Depth of Casing: 10.00m				Dates 25/03/2019 - 26/03/2019		Logged By: DT	

Well	Water Strikes	Rotary Coring					Depth (m)	Level (m AOD)	N Value	Legend	Stratum Description	
		Depth (m)	TCR	SCR	RQD	FI						
											MADE GROUND (Driller's Description)	1
												2
												3
												4
												5
							5.60	147.40			TILL (Driller's Description)	6
												7
												8
												9
												10
							10.20	142.80			SANDSTONE (Driller's Description)	11
												12
												13
												14
												15
												16
							17.00	136.00			COAL (Driller's Description)	17
							18.40	134.60			SANDSTONE with mudstone bands (Driller's Description)	18
												19
												20
												21
												22
												23
												24
												25
												26
												27
												28
												29
							30.00	123.00				End of Borehole at 30.00 m
											31	
											32	
											33	
											34	
											35	
											36	
											37	
											38	
											39	
											40	

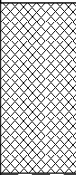
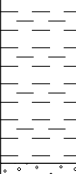
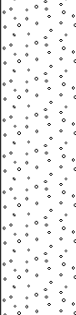
Remarks: 1. Rotary open probehole from GL to 30.0m 2. Probehole noted as wet 3. Gas monitoring well installed				Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample SPT - Standard Penetration Test (split spoon) CPT - Standard Penetration Test (solid cone)				W - Water sample U - Undisturbed sample TCR - Total Core Recovery SCR - Solid Core Recovery RQD - Rock Quality Designation					
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		Integral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com		Project Name: Dragon Parc				Project No.: 12392		Borehole No.: PH2 Sheet 1 of 1	
Location: Merthyr Tydfil				Client: Huntley Wood Investments				Coordinates: 305534.00mE 204125.00mN		Hole Type: RO	
Equipment: Klemm 802				Diameter of Casing: 150mm				Level: 155.00mAOD		Scale 1:200	
Diameter of Boring: 142mm				Depth of Casing: 18.00m				Dates 25/03/2019 - 25/03/2019		Logged By: DT	

Well	Water Strikes	Rotary Coring					Depth (m)	Level (m AOD)	N Value	Legend	Stratum Description		
		Depth (m)	TCR	SCR	RQD	FI							
											FILL (Driller's Description)	1	
												2	
													3
													4
													5
													6
													7
								7.30	147.70			TILL (Driller's Description)	8
								9.70	145.30			SAND and GRAVEL (wet)(Driller's Description)	9
													11
													12
													13
													14
													15
													16
								16.90	138.10			Weathered MUDSTONE (Broken) (Driller's Description)	17
													18
													19
													20
													21
								21.80	133.20			COAL (Driller's Description)	22
								22.50	132.50			MUDSTONE (Driller's Description)	23
								23.00	132.00			Dark MUDSTONE with coal traces (Driller's Description)	24
								24.00	131.00			MUDSTONE with sandstone bands (Driller's Description)	25
											26		
											27		
											28		
											29		
						30.00	125.00			End of Borehole at 30.00 m	30		
											31		
											32		
											33		
											34		
											35		
											36		
											37		
											38		
											39		
											40		

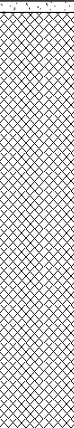
Remarks: 1. Rotary open probehole from GL to 30.0m 2. Probehole noted as wet				Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample SPT - Standard Penetration Test (split spoon) CPT - Standard Penetration Test (solid cone)				W - Water sample U - Undisturbed sample TCR - Total Core Recovery SCR - Solid Core Recovery RQD - Rock Quality Designation					
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		Integral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com		Project Name: Dragon Parc				Project No.: 12392		Borehole No.: PH3 Sheet 1 of 1	
Location: Merthyr Tydfil				Client: Huntley Wood Investments				Coordinates: 305492.00mE 204121.00mN		Hole Type: RO	
Equipment: Klemm 802				Diameter of Casing: 150mm				Level: 157.00mAOD		Scale 1:200	
Diameter of Boring: 142mm				Depth of Casing: 30.00m				Dates 22/03/2019 - 25/03/2019		Logged By: ND	

Well	Water Strikes	Rotary Coring					Depth (m)	Level (m AOD)	N Value	Legend	Stratum Description		
		Depth (m)	TCR	SCR	RQD	FI							
							4.50	152.50			FILL (Driller's Description)	1	
												2	
												3	
												4	
								9.00	148.00			CLAY (Driller's Description)	5
												6	
												7	
												8	
								17.80	139.20			GRAVELS (Driller's Description)	9
												10	
												11	
												12	
												13	
												14	
												15	
												16	
												17	
								19.70	137.30			MUDSTONE (Driller's Description)	18
												19	
								21.10	135.90			COAL (Driller's Description)	20
												21	
								26.40	130.60			MUDSTONE (Driller's Description)	22
												23	
												24	
												25	
												26	
								30.00	127.00			SANDSTONE (Driller's Description)	27
												28	
												29	
												End of Borehole at 30.00 m	30
											31		
											32		
											33		
											34		
											35		
											36		
											37		
											38		
											39		
											40		

Remarks: 1. Rotary open probehole from GL to 30.0m 2. Probehole noted as wet		Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample SPT - Standard Penetration Test (split spoon) CPT - Standard Penetration Test (solid cone)		W - Water sample U - Undisturbed sample TCR - Total Core Recovery SCR - Solid Core Recovery RQD - Rock Quality Designation		
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		Integral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com		Project Name: Dragon Parc				Project No.: 12392		Borehole No.: PH4 Sheet 1 of 1	
Location: Merthyr Tydfil				Client: Huntley Wood Investments				Coordinates: 305411.00mE 204122.00mN		Hole Type: RO	
Equipment: Klemm 802				Diameter of Casing: 150mm				Level: 157.00mAOD		Scale 1:200	
Diameter of Boring: 142mm				Depth of Casing: 12.00m				Dates 21/03/2019 - 21/03/2019		Logged By: ND	

Well	Water Strikes	Rotary Coring					Depth (m)	Level (m AOD)	N Value	Legend	Stratum Description						
		Depth (m)	TCR	SCR	RQD	FI											
						0.30	156.70			TARMAC and CONCRETE (Driller's Description)	1						
															FILL (Driller's Description)	2	
																3	
																4	
																5	
																6	
																7	
																8	
																9	
																10	
																11	
						11.50	145.50									MUDSTONE (Driller's Description)	12
																	13
																	14
																	15
																	16
																	17
						17.50	139.50									OLD WORKINGS (Driller's Description)	18
						19.10	137.90									MUDSTONE (Driller's Description)	19
																	20
																	21
																	22
																	23
						24.10	132.90									SANDSTONE (Driller's Description)	24
																	25
																	26
																	27
																	28
																	29
						30.00	127.00										
										31							
										32							
										33							
										34							
										35							
										36							
										37							
										38							
										39							
										40							

Remarks: 1. Rotary open probehole from GL to 30.0m 2. Probehole noted as wet at 12m				Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample SPT - Standard Penetration Test (split spoon) CPT - Standard Penetration Test (solid cone)				W - Water sample U - Undisturbed sample TCR - Total Core Recovery SCR - Solid Core Recovery RQD - Rock Quality Designation					
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Intégral Géotechnique Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com		Project Name: Dragon Parc				Project No.: 12392		Borehole No.: PH5 Sheet 1 of 1						
Location: Merthyr Tydfil		Client: Huntley Wood Investments				Coordinates: 305402.00mE 204157.00mN		Hole Type: RO						
Equipment: Klemm 802		Diameter of Casing: 150mm				Level: 158.00mAOD		Scale 1:200						
Diameter of Boring: 142mm		Depth of Casing: 12.00m				Dates 22/03/2019 - 22/03/2019		Logged By: ND						
Well	Water Strikes	Rotary Coring					Depth (m)	Level (m AOD)	N Value	Legend	Stratum Description			
		Depth (m)	TCR	SCR	RQD	FI								
							0.30	157.70			TARMAC and CONCRETE (Driller's Description) FILL (Driller's Description)	1		
							2							
							3							
							4							
							4.20	153.80			CLAY (Driller's Description)	5		
							6							
							7							
							7.40	150.60			GRAVELS (Driller's Description)	8		
							9							
							10							
11.60	146.40		MUDSTONE (Driller's Description)	11										
12														
13														
14														
16.00	142.00		COAL (Driller's Description)	15										
16														
17.30	140.70			17										
18.10	139.90		Soft drill poor returns (Driller's Description) MUDSTONE (Driller's Description)	18										
19														
20														
21														
22.00	136.00		SANDSTONE (Driller's Description)	22										
23														
24														
25														
26														
27														
28														
29														
30.00	128.00		End of Borehole at 30.00 m	30										
														31
														32
														33
														34
														35
														36
														37
														38
														39
														40

Remarks:

1. Rotary open probehole from GL to 30.0m
2. Probehole noted as wet at 16.0m

Key:

D - Small disturbed sample
B - Bulk disturbed sample
ES - Environmental soil sample
SPT - Standard Penetration Test (split spoon)
CPT - Standard Penetration Test (solid cone)

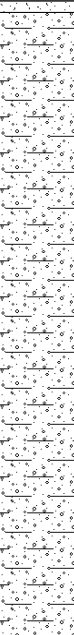
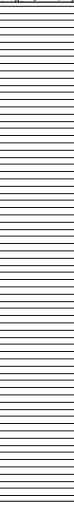
W - Water sample
U - Undisturbed sample
TCR - Total Core Recovery
SCR - Solid Core Recovery
RQD - Rock Quality Designation

		Integral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com		Project Name: Dragon Parc				Project No.: 12392		Borehole No.: PH6 Sheet 1 of 1	
Location: Merthyr Tydfil				Client: Huntley Wood Investments				Coordinates: 305497.00mE 204204.00mN		Hole Type: RO	
Equipment: Klemm 802				Diameter of Casing: 150mm				Level: 159.00mAOD		Scale 1:200	
Diameter of Boring: 142mm				Depth of Casing: 27.00m				Dates 02/04/2019 - 02/04/2019		Logged By: ND	

Well	Water Strikes	Rotary Coring					Depth (m)	Level (m AOD)	N Value	Legend	Stratum Description		
		Depth (m)	TCR	SCR	RQD	FI							
											FILL (Driller's Description)	1	
												2	
												3	
												4	
												5	
												6	
												7	
								7.40	151.60			SILTY SANDY GRAVEL (Driller's Description)	8
													9
													10
													11
													12
													13
													14
													15
													16
													17
													18
													19
													20
													21
													22
													23
								23.40	135.60			MUDSTONE (Driller's Description)	24
													25
													26
													27
													28
													29
								30.00	129.00				End of Borehole at 30.00 m
											31		
											32		
											33		
											34		
											35		
											36		
											37		
											38		
											39		
											40		

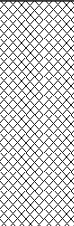
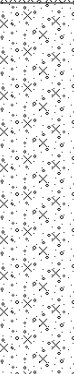
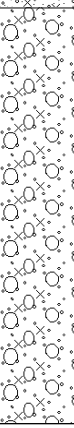
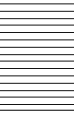
Remarks: 1. Rotary open probehole from GL to 30.0m 2. Excessive water within the sands and gravels below 7.4m.		Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample SPT - Standard Penetration Test (split spoon) CPT - Standard Penetration Test (solid cone)		W - Water sample U - Undisturbed sample TCR - Total Core Recovery SCR - Solid Core Recovery RQD - Rock Quality Designation		
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 Integral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com		Project Name: Dragon Parc		Project No.: 12392		Borehole No.: PH7 Sheet 1 of 1	
Location: Merthyr Tydfil		Client: Huntley Wood Investments		Coordinates: 305393.00mE 204204.00mN		Hole Type: RO	
Equipment: Klemm 802		Diameter of Casing: 150mm		Level: 157.00mAOD		Scale 1:200	
Diameter of Boring: 142mm		Depth of Casing: 17.00m		Dates 22/03/2019 - 22/03/2019		Logged By: ND	

Well	Water Strikes	Rotary Coring					Depth (m)	Level (m AOD)	N Value	Legend	Stratum Description		
		Depth (m)	TCR	SCR	RQD	FI							
							0.30	156.70			TARMAC and CONCRETE (Driller's Description)	1	
												2	
												3	
												4	
												5	
												6	
												7	
												8	
												9	
												10	
												11	
												12	
												13	
												14	
												15	
												16	
								16.80	140.20			MUDSTONE and SANDSTONE (Driller's Description)	17
												18	
												19	
												20	
												21	
												22	
												23	
												24	
												25	
												26	
												27	
												28	
												29	
								30.00	127.00				End of Borehole at 30.00 m
										31			
										32			
										33			
										34			
										35			
										36			
										37			
										38			
										39			
										40			

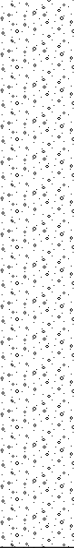
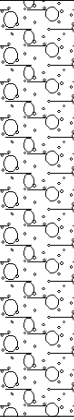
Remarks: 1. Rotary open probehole from GL to 30.0m 2. Probehole noted as wet at 16.0m		Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample SPT - Standard Penetration Test (split spoon) CPT - Standard Penetration Test (solid cone)		W - Water sample U - Undisturbed sample TCR - Total Core Recovery SCR - Solid Core Recovery RQD - Rock Quality Designation		
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		Integral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com		Project Name: Dragon Parc				Project No.: 12392		Borehole No.: PH8 Sheet 1 of 1	
Location: Merthyr Tydfil				Client: Huntley Wood Investments				Coordinates: 305528.00mE 204103.00mN		Hole Type: RO	
Equipment: Klem 802				Diameter of Casing: 150mm				Level: 156.00mAOD		Scale 1:200	
Diameter of Boring: 142mm				Depth of Casing: 27.00m				Dates 04/04/2019 - 04/04/2019		Logged By: ND	

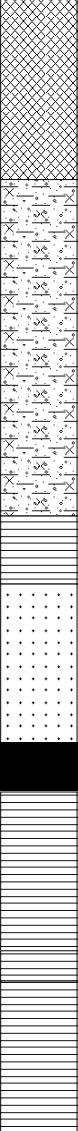
Well	Water Strikes	Rotary Coring					Depth (m)	Level (m AOD)	N Value	Legend	Stratum Description		
		Depth (m)	TCR	SCR	RQD	FI							
							6.00	150.00			FILL (Driller's Description)	1	
											2		
											3		
											4		
											5		
											6		
												SILTY SANDY GRAVELS (Driller's Description)	7
										8			
										9			
										10			
										11			
										12			
										13			
										14			
										15			
										16			
								16.00	140.00			SILTY GRAVEL with BOULDERS (Driller's Description)	17
										18			
										19			
										20			
										21			
										22			
										23			
										24			
										25			
										26			
								27.00	129.00			MUDSTONE (Driller's Description)	27
										28			
										29			
										30			
						30.00	126.00			End of Borehole at 30.00 m		30	
											31		
											32		
											33		
											34		
											35		
											36		
											37		
											38		
											39		
											40		

Remarks: 1. Rotary open probehole from GL to 30.0m 2. Excessive water within the silt and sands below 6.0m depth				Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample SPT - Standard Penetration Test (split spoon) CPT - Standard Penetration Test (solid cone)				W - Water sample U - Undisturbed sample TCR - Total Core Recovery SCR - Solid Core Recovery RQD - Rock Quality Designation					
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		Integral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com		Project Name: Dragon Parc				Project No.: 12392		Borehole No.: PH9 Sheet 1 of 1	
Location: Merthyr Tydfil				Client: Huntley Wood Investments				Coordinates: 305537.00mE 204233.00mN		Hole Type: RO	
Equipment: Klemm 802				Diameter of Casing: 150mm				Level: 158.00mAOD		Scale 1:200	
Diameter of Boring: 142mm				Depth of Casing: 15.00m				Dates 03/04/2019 - 03/04/2019		Logged By: ND	

Well	Water Strikes	Rotary Coring					Depth (m)	Level (m AOD)	N Value	Legend	Stratum Description	
		Depth (m)	TCR	SCR	RQD	FI						
							2.50	155.50			FILL (Driller's Description)	1
											TILL (Driller's Description)	2
							4.50	153.50				3
											SANDY GRAVEL (Driller's Description)	4
											5	
											6	
											7	
											8	
											9	
											10	
											11	
											12	
											13	
											14	
											15	
											16	
											17	
											18	
								19.00	139.00			GRAVEL and BOULDERS with soft bands (Driller's Description)
									20			
									21			
									22			
									23			
									24			
									25			
									26			
									27			
									28			
						30.00	128.00				29	
											30	
											31	
											32	
											33	
											34	
											35	
											36	
											37	
											38	
											39	
											40	

Remarks: 1. Rotary open probehole from GL to 30.0m 2. Groundwater at 10.0m.				Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample SPT - Standard Penetration Test (split spoon) CPT - Standard Penetration Test (solid cone)				W - Water sample U - Undisturbed sample TCR - Total Core Recovery SCR - Solid Core Recovery RQD - Rock Quality Designation					
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Intégral Géotechnique Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com		Project Name: Dragon Parc				Project No.: 12392		Borehole No.: PH10 Sheet 1 of 1					
Location: Merthyr Tydfil		Client: Huntley Wood Investments				Coordinates: 305351.00mE 204233.00mN		Hole Type: RO					
Equipment: Klemm 802		Diameter of Casing: 150mm				Level: 157.00mAOD		Scale 1:200					
Diameter of Boring: 142mm		Depth of Casing: 13.50m				Dates 26/03/2019 - 26/03/2019		Logged By: DT					
Well	Water Strikes	Rotary Coring					Depth (m)	Level (m AOD)	N Value	Legend	Stratum Description		
		Depth (m)	TCR	SCR	RQD	FI							
											MADE GROUND (Driller's Description)	1	
												2	
												3	
												4	
							4.80	152.20					5
													6
													7
													8
													9
													10
													11
													12
													13
							13.70	143.30					14
													15
					15.50	141.50			16				
									17				
									18				
									19				
					19.70	137.30			20				
					21.00	136.00			21				
									22				
									23				
									24				
									25				
					25.20	131.80			26				
					26.00	131.00			27				
									28				
									29				
									30				
					30.00	127.00			31				
									32				
									33				
									34				
									35				
									36				
									37				
									38				
									39				
									40				

Remarks:			Key:					
1. Rotary open probehole from GL to 30.0m			D - Small disturbed sample			W - Water sample		
2. Probehole noted as wet			B - Bulk disturbed sample			U - Undisturbed sample		
3. Gas monitoring well installed			ES - Environmental soil sample			TCR - Total Core Recovery		
			SPT - Standard Penetration Test (split spoon)			SCR - Solid Core Recovery		
			CPT - Standard Penetration Test (solid cone)			RQD - Rock Quality Designation		

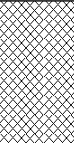


		Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com		Project Name: Dragon Parc				Project No.: 12392		Borehole No.: PH11 Sheet 1 of 1	
Location: Merthyr Tydfil				Client: Huntley Wood Investments				Coordinates: 305420.00mE 204231.00mN		Hole Type: RO	
Equipment: Klemm 802				Diameter of Casing: 150mm				Level: 157.00mAOD		Scale 1:200	
Diameter of Boring: 142mm				Depth of Casing: 15.00m				Dates 26/03/2019 - 27/03/2019		Logged By: DT	

Well	Water Strikes	Rotary Coring					Depth (m)	Level (m AOD)	N Value	Legend	Stratum Description	
		Depth (m)	TCR	SCR	RQD	FI						
							7.10	149.90			MADE GROUND (Driller's Description)	1
												2
												3
												4
												5
												6
												7
												8
												9
												10
												11
												12
												13
												14
												15
						14.40	142.60			CLAY/MUDSTONE (Driller's Description)	16	
						15.00	142.00			SANDSTONE (Driller's Description)	17	
											18	
						18.90	138.10			BROKEN GROUND (wet) (Driller's Description)	19	
						19.90	137.10			SANDSTONE (Driller's Description)	20	
											21	
											22	
						23.20	133.80			COAL (Driller's Description)	23	
						24.40	132.60			MUDSTONE (Driller's Description)	24	
											25	
											26	
											27	
						28.00	129.00			SANDSTONE (Driller's Description)	28	
											29	
						30.00	127.00			End of Borehole at 30.00 m	30	
											31	
											32	
											33	
											34	
											35	
											36	
											37	
											38	
											39	
											40	

Remarks: 1. Rotary open probehole from GL to 30.0m 2. Probehole noted as wet				Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample SPT - Standard Penetration Test (split spoon) CPT - Standard Penetration Test (solid cone)				W - Water sample U - Undisturbed sample TCR - Total Core Recovery SCR - Solid Core Recovery RQD - Rock Quality Designation					
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		Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com		Project Name: Dragon Parc				Project No.: 12392		Borehole No.: PH12 Sheet 1 of 1	
Location: Merthyr Tydfil				Client: Huntley Wood Investments				Coordinates: 305507.00mE 204231.00mN		Hole Type: RO	
Equipment: Klemm 802				Diameter of Casing: 150mm				Level: 157.00mAOD		Scale 1:200	
Diameter of Boring: 142mm				Depth of Casing: 18.00m				Dates 03/04/2019 - 03/04/2019		Logged By: DT	

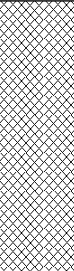
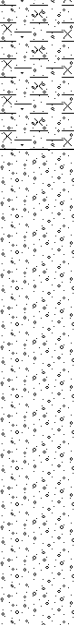
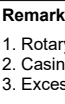
Well	Water Strikes	Rotary Coring					Depth (m)	Level (m AOD)	N Value	Legend	Stratum Description	
		Depth (m)	TCR	SCR	RQD	FI						
							3.80	153.20			FILL (Driller's Description)	1
											2	
											3	
											4	
											5	
											6	
											7	
											8	
											9	
											10	
											11	
											12	
											13	
											14	
											15	
											16	
											17	
											18	
											19	
											20	
											21	
											22	
											23	
											24	
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											29	
												
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10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
							30.00	127.00			SANDY GRAVEL (Driller's Description)	9
											10	
											11	
											12	
											13	
											14	
											15	
											16	
											17	
											18	
											19	
20												
21												
22												
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27												
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30												
31												
32												
33												
34												
35												
36												
37												
38												
39												
40												

Remarks: 1. Rotary open probehole from GL to 30.0m 2. Groundwater at 9.0m				Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample SPT - Standard Penetration Test (split spoon) CPT - Standard Penetration Test (solid cone)				W - Water sample U - Undisturbed sample TCR - Total Core Recovery SCR - Solid Core Recovery RQD - Rock Quality Designation					
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Intégral Géotechnique Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com		Project Name: Dragon Parc				Project No.: 12392		Borehole No.: PH13 Sheet 1 of 1				
Location: Merthyr Tydfil		Client: Huntley Wood Investments				Coordinates: 305405.00mE 204329.00mN		Hole Type: RO				
Equipment: Klemm 802		Diameter of Casing: 150mm				Level: 157.00mAOD		Scale 1:200				
Diameter of Boring: 142mm		Depth of Casing: 30.00m				Dates 27/03/2019 - 27/03/2019		Logged By: DT				
Well	Water Strikes	Rotary Coring				Depth (m)	Level (m AOD)	N Value	Legend	Stratum Description		
		Depth (m)	TCR	SCR	RQD							FI
										MADE GROUND (Driller's Description)	1	
												2
												3
												4
												5
							6.40	150.60				6
											TILL (Driller's Description)	7
							8.00	149.00				8
											SANDS and GRAVEL (wet) (Driller's Description)	9
												10
												11
												12
							13.20	143.80				13
											MUDSTONE(Driller's Description)	14
												15
							16.70	140.30				16
					17.90	139.10				17		
									COAL (Driller's Description)	18		
									MUDSTONE (Driller's Description)	19		
										20		
										21		
					21.70	135.30				22		
					22.50	134.50				23		
									Dark MUDSTONE with coal traces (Driller's Description)	24		
									MUDSTONE with sandstone bands (Driller's Description)	25		
										26		
										27		
										28		
										29		
					30.00	127.00				30		
									End of Borehole at 30.00 m	31		
										32		
										33		
										34		
										35		
										36		
										37		
										38		
										39		
										40		

Remarks: 1. Rotary open probehole from GL to 30.0m 2. Probehole noted as wet 3. Gas monitoring well installed		Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample SPT - Standard Penetration Test (split spoon) CPT - Standard Penetration Test (solid cone) W - Water sample U - Undisturbed sample TCR - Total Core Recovery SCR - Solid Core Recovery RQD - Rock Quality Designation		

		Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com		Project Name: Dragon Parc				Project No.: 12392		Borehole No.: PH14 Sheet 1 of 1	
Location: Merthyr Tydfil				Client: Huntley Wood Investments				Coordinates: 305480.00mE 204377.00mN		Hole Type: RO	
Equipment: Klemm 802				Diameter of Casing: 150mm				Level: 157.00mAOD		Scale 1:200	
Diameter of Boring: 142mm				Depth of Casing: 22.00m				Dates 28/03/2019 - 28/03/2019		Logged By: DT	

Well	Water Strikes	Rotary Coring					Depth (m)	Level (m AOD)	N Value	Legend	Stratum Description	
		Depth (m)	TCR	SCR	RQD	FI						
							7.20	149.80			MADE GROUND (Driller's Description)	1
											2	
											3	
											4	
											5	
											6	
											7	
											8	
											9	
											10	
							11.20	145.80			TILL (Driller's Description)	11
											12	
											13	
											14	
											15	
											16	
											17	
											18	
											19	
											20	
							24.00	133.00			SANDS and GRAVEL (Driller's Description)	21
											22	
											23	
											24	
											25	
											26	
											27	
											28	
											29	
											30	
							26.50	130.50			SILT, SAND and GRAVEL (Driller's Description)	31
											32	
											33	
											34	
											35	
											36	
											37	
											38	
											39	
											40	

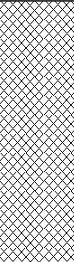
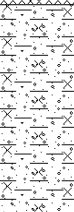
Remarks: 1. Rotary open probehole from GL to 30.0m 2. Casing parted when advancing between 22.0m and 24.0m depth 3. Excessive water at 24.0m depth				Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample SPT - Standard Penetration Test (split spoon) CPT - Standard Penetration Test (solid cone)				W - Water sample U - Undisturbed sample TCR - Total Core Recovery SCR - Solid Core Recovery RQD - Rock Quality Designation					
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		Integral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com		Project Name: Dragon Parc				Project No.: 12392		Borehole No.: PH15 Sheet 1 of 1	
Location: Merthyr Tydfil				Client: Huntley Wood Investments				Coordinates: 305388.00mE 204350.00mN		Hole Type: RO	
Equipment: Klemm 802				Diameter of Casing: 150mm				Level: 156.00mAOD		Scale 1:200	
Diameter of Boring: 142mm				Depth of Casing: 15.00m				Dates 27/03/2019 - 27/03/2019		Logged By: DT	

Well	Water Strikes	Rotary Coring					Depth (m)	Level (m AOD)	N Value	Legend	Stratum Description		
		Depth (m)	TCR	SCR	RQD	FI							
											MADE GROUND (Driller's Description)	1	
												2	
													3
													4
								4.80	151.20			SANDS and GRAVEL (wet) (Driller's Description)	5
													6
													7
													8
													9
													10
													11
													12
													13
													14
								14.90	141.10			COAL (Driller's Description)	15
								15.70	140.30			MUDSTONE (Driller's Description)	16
													17
								17.50	138.50			Dark MUDSTONE (Driller's Description)	18
								18.00	138.00			COAL (Driller's Description)	19
								18.20	137.80			MUDSTONE (Driller's Description)	20
								19.00	137.00			COAL (Driller's Description)	21
						19.30	136.70			MUDSTONE (Driller's Description)	22		
											23		
						21.10	134.90			SANDSTONE with mudstone bands (Driller's Description)	24		
											25		
											26		
											27		
											28		
											29		
						30.00	126.00			End of Borehole at 30.00 m	30		
											31		
											32		
											33		
											34		
											35		
											36		
											37		
											38		
											39		
											40		

Remarks: 1. Rotary open probehole from GL to 30.0m 2. Probehole noted as wet				Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample SPT - Standard Penetration Test (split spoon) CPT - Standard Penetration Test (solid cone)				W - Water sample U - Undisturbed sample TCR - Total Core Recovery SCR - Solid Core Recovery RQD - Rock Quality Designation					
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		Integral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com		Project Name: Dragon Parc				Project No.: 12392		Borehole No.: PH16 Sheet 1 of 1	
Location: Merthyr Tydfil				Client: Huntley Wood Investments				Coordinates: 305472.00mE 204413.00mN		Hole Type: RO	
Equipment: Klemm 802				Diameter of Casing: 150mm				Level: 157.00mAOD		Scale 1:200	
Diameter of Boring: 142mm				Depth of Casing: 25.50m				Dates 28/03/2019 - 29/03/2019		Logged By: DT	

Well	Water Strikes	Rotary Coring					Depth (m)	Level (m AOD)	N Value	Legend	Stratum Description		
		Depth (m)	TCR	SCR	RQD	FI							
							7.00	150.00			MADE GROUND (Driller's Description)	1	
											2		
											3		
											4		
											5		
											6		
												TILL (Driller's Description)	7
												8	
												9	
												10	
												11	
												12	
												SANDS and GRAVEL (silt) (wet) (Driller's Description)	13
												14	
												15	
												16	
												17	
												18	
												19	
												20	
												21	
												22	
												23	
												24	
												25	
												SILT and SAND (excessive water) (Driller's Description)	26
												27	
												28	
												29	
												30	
							30.00	127.00			End of Borehole at 30.00 m	30	
	31												
	32												
	33												
	34												
	35												
	36												
	37												
	38												
	39												
40													

Remarks: 1. Rotary open probehole from GL to 30.0m 2. Probehole noted as wet from 12.5m and excessive water from 22.5m.				Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample SPT - Standard Penetration Test (split spoon) CPT - Standard Penetration Test (solid cone)				W - Water sample U - Undisturbed sample TCR - Total Core Recovery SCR - Solid Core Recovery RQD - Rock Quality Designation					
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		Integral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com		Project Name: Dragon Parc				Project No.: 12392		Borehole No.: PH17 Sheet 1 of 1	
Location: Merthyr Tydfil				Client: Huntley Wood Investments				Coordinates: 305399.00mE 204456.00mN		Hole Type: RO	
Equipment: Klemm 802				Diameter of Casing: 150mm				Level: 159.00mAOD		Scale 1:200	
Diameter of Boring: 142mm				Depth of Casing: 15.00m				Dates 01/04/2019 - 01/04/2019		Logged By: DT	

Well	Water Strikes	Rotary Coring					Depth (m)	Level (m AOD)	N Value	Legend	Stratum Description		
		Depth (m)	TCR	SCR	RQD	FI							
											Fill (Driller's Description)	1	
												2	
												3	
												4	
								4.90	154.10				5
													6
													7
													8
													9
													10
													11
													12
													13
													14
								14.80	144.20				15
													16
													17
													18
													19
													20
								21.00	138.00				21
								21.80	137.20				22
													23
													24
													25
													26
													27
													28
													29
								30.00	129.00				30
											31		
											32		
											33		
											34		
											35		
											36		
											37		
											38		
											39		
											40		

Remarks: 1. Rotary open probehole from GL to 30.0m				Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample SPT - Standard Penetration Test (split spoon) CPT - Standard Penetration Test (solid cone)				W - Water sample U - Undisturbed sample TCR - Total Core Recovery SCR - Solid Core Recovery RQD - Rock Quality Designation					
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		Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com		Project Name: Dragon Parc				Project No.: 12392		Borehole No.: PH18 Sheet 1 of 1	
Location: Merthyr Tydfil				Client: Huntley Wood Investments				Coordinates: 305350.00mE 204451.00mN		Hole Type: RO	
Equipment: Klemm 802				Diameter of Casing: 150mm				Level: 157.00mAOD		Scale 1:200	
Diameter of Boring: 142mm				Depth of Casing: 10.00m				Dates 01/04/2019 - 01/04/2019		Logged By: DT	

Well	Water Strikes	Rotary Coring					Depth (m)	Level (m AOD)	N Value	Legend	Stratum Description	
		Depth (m)	TCR	SCR	RQD	FI						
											FILL (Driller's Description)	1
												2
												3
												4
							5.00	152.00				5
												6
												7
												8
												9
							10.00	147.00				10
												11
												12
												13
												14
												15
												16
												17
												18
												19
												20
						20.50	136.50				DARK MUDSTONE with COAL TRACES (Driller's Description)	21
						21.10	135.90				SANDSTONE with MUDSTONE BANDS (Driller's Description)	22
												23
												24
												25
												26
												27
												28
												29
						30.00	127.00				End of Borehole at 30.00 m	30
												31
												32
												33
												34
												35
												36
												37
												38
												39
												40

Remarks: 1. Rotary open probehole from GL to 30.0m 2. Probehole noted as wet 3. Gas monitoring well installed				Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample SPT - Standard Penetration Test (split spoon) CPT - Standard Penetration Test (solid cone)				W - Water sample U - Undisturbed sample TCR - Total Core Recovery SCR - Solid Core Recovery RQD - Rock Quality Designation					
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		Integral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com		Project Name: Dragon Parc				Project No.: 12392		Borehole No.: PH19 Sheet 1 of 1	
Location: Merthyr Tydfil				Client: Huntley Wood Investments				Coordinates: 305416.00mE 204477.00mN		Hole Type: RO	
Equipment: Klemm 802				Diameter of Casing: 150mm				Level: 160.00mAOD		Scale 1:200	
Diameter of Boring: 142mm				Depth of Casing: 15.00m				Dates 29/03/2019 - 29/03/2019		Logged By: DT	

Well	Water Strikes	Rotary Coring					Depth (m)	Level (m AOD)	N Value	Legend	Stratum Description		
		Depth (m)	TCR	SCR	RQD	FI							
											MADE GROUND (Driller's Description)	1	
												2	
												3	
												4	
												5	
												6	
		7.00						153.00			TILL (Driller's Description)	7	
												8	
												9	
												10	
		11.00						149.00			SANDS and GRAVEL (Driller's Description)	11	
												12	
												13	
												14	
												15	
												16	
												17	
												18	
												19	
												20	
												21	
												22	
												23	
												24	
												25	
												26	
												27	
												28	
		30.00						130.00				End of Borehole at 30.00 m	30
													31
											32		
											33		
											34		
											35		
											36		
											37		
											38		
											39		
											40		

Remarks: 1. Rotary open probehole from GL to 30.0m 2. Probehole noted as wet		Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample SPT - Standard Penetration Test (split spoon) CPT - Standard Penetration Test (solid cone)		W - Water sample U - Undisturbed sample TCR - Total Core Recovery SCR - Solid Core Recovery RQD - Rock Quality Designation		
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APPENDIX C

LABORATORY CHEMICAL TEST RESULTS



Lowri Williams
Integral Geotechnique
Integral House
7 Beddau Way
Castlegate Business Park
CF83 2AX

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Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
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e: reception@i2analytical.com

Analytical Report Number : 19-35538

Project / Site name: Dragon Parc, Merthyr Tydfil

Samples received on: 01/04/2019

Your job number: 12392

Samples instructed on: 02/04/2019

Your order number:

Analysis completed by: 10/04/2019

Report Issue Number: 1

Report issued on: 10/04/2019

Samples Analysed: 7 soil samples

Signed: 

Rexona Rahman
Head of Customer Services
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Analytical Report Number: 19-35538

Project / Site name: Dragon Parc, Merthyr Tydfil

Lab Sample Number				1190956	1190957	1190958	1190959	1190960
Sample Reference				TP1	TP3	TP7	TP9	TP11
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.70	0.40	0.50	0.50
Date Sampled				27/03/2019	27/03/2019	27/03/2019	27/03/2019	28/03/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	11	13	9.7	4.5	9.6
Total mass of sample received	kg	0.001	NONE	1.4	1.1	1.3	1.3	1.1

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.6	7.7	8.4	8.5	8.1
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO ₄	mg/kg	50	MCERTS	970	2000	2100	2900	1200
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.14	0.46	0.19	0.25	0.15
Sulphide	mg/kg	1	MCERTS	6.3	160	450	17	< 1.0
Total Sulphur	mg/kg	50	MCERTS	1000	1500	2100	1800	790
Total Organic Carbon (TOC)	%	0.1	MCERTS	1.7	3.8	3.7	2.2	3.1
Loss on Ignition @ 450°C	%	0.2	MCERTS	21.5	18.8	16.8	24.1	24.4

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	0.80	0.28	0.36	0.85	0.94
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.36
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.22
Phenanthrene	mg/kg	0.05	MCERTS	1.4	1.0	0.86	1.4	2.1
Anthracene	mg/kg	0.05	MCERTS	0.23	0.19	0.16	0.20	0.42
Fluoranthene	mg/kg	0.05	MCERTS	0.74	1.7	0.77	0.56	1.7
Pyrene	mg/kg	0.05	MCERTS	0.57	1.4	0.62	0.50	1.2
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.49	1.0	0.61	0.46	1.4
Chrysene	mg/kg	0.05	MCERTS	0.26	1.0	0.66	0.37	0.94
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.81	0.52	0.30	1.3
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.75	0.53	0.22	0.70
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	1.0	0.55	0.13	0.87
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.47	0.26	< 0.05	0.53
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	0.70	0.32	< 0.05	0.53

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	4.51	10.3	6.22	5.00	13.2
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Analytical Report Number: 19-35538
Project / Site name: Dragon Parc, Merthyr Tydfil

Lab Sample Number				1190956	1190957	1190958	1190959	1190960
Sample Reference				TP1	TP3	TP7	TP9	TP11
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.70	0.40	0.50	0.50
Date Sampled				27/03/2019	27/03/2019	27/03/2019	27/03/2019	28/03/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	9.1	26	22	11	15
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.0	1.3	2.1	0.92	0.96
Boron (water soluble)	mg/kg	0.2	MCERTS	2.1	1.1	1.9	1.6	1.1
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	8.8	17	28	6.8	8.4
Copper (aqua regia extractable)	mg/kg	1	MCERTS	56	89	91	48	62
Lead (aqua regia extractable)	mg/kg	1	MCERTS	22	190	110	20	29
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	2.2	< 0.3	1.1	0.6
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	33	30	30	29	36
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	4.4	4.3
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	16	33	57	9.5	16
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	63	140	99	64	64

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	1.7	1.4	< 1.0	< 1.0	2.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	10	8.4	2.2	2.4	4.9
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	19	28	< 8.0	< 8.0	11
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	35	30	37	23	130
TPH-CWG - Aliphatic >EC16 - EC35	mg/kg	10	MCERTS	53	58	37	23	140
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4	16	< 8.4	16
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	65	68	47	33	150
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	65	68	63	33	160

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	2.2	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	9.9	3.7	3.8	4.5	4.6
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	21	19	13	< 10	18
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	46	29	75	< 10	110
TPH-CWG - Aromatic >EC35 - EC40	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4	< 8.4	< 8.4	< 8.4
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	79	52	92	20	130
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	79	52	92	20	130

TPH Total C5 - C44	mg/kg	10	NONE	140	120	150	53	300
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Analytical Report Number: 19-35538

Project / Site name: Dragon Parc, Merthyr Tydfil

Lab Sample Number				1190956	1190957	1190958	1190959	1190960
Sample Reference				TP1	TP3	TP7	TP9	TP11
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.70	0.40	0.50	0.50
Date Sampled				27/03/2019	27/03/2019	27/03/2019	27/03/2019	28/03/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
Chloroethane	µg/kg	1	NONE	-	< 1.0	-	-	< 1.0
Bromomethane	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
Vinyl Chloride	µg/kg	1	NONE	-	< 1.0	-	-	< 1.0
Trichlorofluoromethane	µg/kg	1	NONE	-	< 1.0	-	-	< 1.0
1,1-Dichloroethene	µg/kg	1	NONE	-	< 1.0	-	-	< 1.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,1-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
2,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Trichloromethane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,2-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,1-Dichloropropene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	< 1.0	-	-	< 1.0
Benzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Tetrachloromethane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Trichloroethene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Dibromomethane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Bromodichloromethane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
Toluene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
Dibromochloromethane	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
Tetrachloroethene	µg/kg	1	NONE	-	< 1.0	-	-	< 1.0
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
Chlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
p & m-Xylene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Styrene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Tribromomethane	µg/kg	1	NONE	-	< 1.0	-	-	< 1.0
o-Xylene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Isopropylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Bromobenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
n-Propylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
2-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
4-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
tert-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
sec-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Hexachlorobutadiene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0

Analytical Report Number: 19-35538
Project / Site name: Dragon Parc, Merthyr Tydfil

Lab Sample Number				1190956	1190957	1190958	1190959	1190960
Sample Reference				TP1	TP3	TP7	TP9	TP11
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.70	0.40	0.50	0.50
Date Sampled				27/03/2019	27/03/2019	27/03/2019	27/03/2019	28/03/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
SVOCs								
Aniline	mg/kg	0.1	NONE	-	< 0.1	-	-	< 0.1
Phenol	mg/kg	0.2	ISO 17025	-	< 0.2	-	-	< 0.2
2-Chlorophenol	mg/kg	0.1	MCERTS	-	< 0.1	-	-	< 0.1
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	< 0.2	-	-	< 0.2
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	-	-	< 0.2
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	< 0.1	-	-	< 0.1
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	-	-	< 0.2
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	< 0.1	-	-	< 0.1
2-Methylphenol	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
Hexachloroethane	mg/kg	0.05	MCERTS	-	< 0.05	-	-	< 0.05
Nitrobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
4-Methylphenol	mg/kg	0.2	NONE	-	< 0.2	-	-	< 0.2
Isophorone	mg/kg	0.2	MCERTS	-	< 0.2	-	-	< 0.2
2-Nitrophenol	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
Naphthalene	mg/kg	0.05	MCERTS	-	0.28	-	-	0.94
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
4-Chloroaniline	mg/kg	0.1	NONE	-	< 0.1	-	-	< 0.1
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	< 0.1	-	-	< 0.1
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	< 0.1	-	-	< 0.1
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	< 0.1	-	-	< 0.1
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	< 0.2	-	-	< 0.2
2-Methylnaphthalene	mg/kg	0.1	NONE	-	0.5	-	-	0.9
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	< 0.1	-	-	< 0.1
Dimethylphthalate	mg/kg	0.1	MCERTS	-	< 0.1	-	-	< 0.1
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	< 0.1	-	-	< 0.1
Acenaphthylene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	0.36
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	< 0.2	-	-	< 0.2
Dibenzofuran	mg/kg	0.2	MCERTS	-	< 0.2	-	-	0.4
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	< 0.3	-	-	< 0.3
Diethyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2	-	-	< 0.2
4-Nitroaniline	mg/kg	0.2	MCERTS	-	< 0.2	-	-	< 0.2
Fluorene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	0.22
Azobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	< 0.2	-	-	< 0.2
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
Phenanthrene	mg/kg	0.05	MCERTS	-	1.0	-	-	2.1
Anthracene	mg/kg	0.05	MCERTS	-	0.19	-	-	0.42
Carbazole	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2	-	-	< 0.2
Anthraquinone	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
Fluoranthene	mg/kg	0.05	MCERTS	-	1.7	-	-	1.7
Pyrene	mg/kg	0.05	MCERTS	-	1.4	-	-	1.2
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	< 0.3	-	-	< 0.3
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	1.0	-	-	1.4
Chrysene	mg/kg	0.05	MCERTS	-	1.0	-	-	0.94
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	0.81	-	-	1.3
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	0.75	-	-	0.70
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	1.0	-	-	0.87
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	0.47	-	-	0.53
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	0.70	-	-	0.53

Analytical Report Number: 19-35538

Project / Site name: Dragon Parc, Merthyr Tydfil

Lab Sample Number				1190956	1190957	1190958	1190959	1190960
Sample Reference				TP1	TP3	TP7	TP9	TP11
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.70	0.40	0.50	0.50
Date Sampled				27/03/2019	27/03/2019	27/03/2019	27/03/2019	28/03/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

PCBs by GC-MS

PCB Congener 28	mg/kg	0.001	MCERTS	< 0.001	< 0.001	0.008	< 0.001	< 0.001
PCB Congener 52	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
PCB Congener 101	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
PCB Congener 118	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
PCB Congener 138	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
PCB Congener 153	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
PCB Congener 180	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

Total PCBs by GC-MS

Total PCBs	mg/kg	0.007	MCERTS	< 0.007	< 0.007	0.008	< 0.007	< 0.007
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Analytical Report Number: 19-35538

Project / Site name: Dragon Parc, Merthyr Tydfil

Lab Sample Number				1190961	1190962			
Sample Reference				TP14	TP18			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.30	0.50			
Date Sampled				28/03/2019	28/03/2019			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		
Stone Content				%	0.1	NONE	< 0.1	< 0.1
Moisture Content				%	N/A	NONE	9.6	4.5
Total mass of sample received				kg	0.001	NONE	1.3	1.3

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected			
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.3	7.9			
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Total Sulphate as SO ₄	mg/kg	50	MCERTS	5100	6700			
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	1.4	2.2			
Sulphide	mg/kg	1	MCERTS	88	8.0			
Total Sulphur	mg/kg	50	MCERTS	3100	2600			
Total Organic Carbon (TOC)	%	0.1	MCERTS	3.4	1.3			
Loss on Ignition @ 450°C	%	0.2	MCERTS	20.3	16.6			

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0			
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	1.8	0.41			
Acenaphthylene	mg/kg	0.05	MCERTS	0.76	< 0.05			
Acenaphthene	mg/kg	0.05	MCERTS	18	< 0.05			
Fluorene	mg/kg	0.05	MCERTS	14	< 0.05			
Phenanthrene	mg/kg	0.05	MCERTS	53	0.70			
Anthracene	mg/kg	0.05	MCERTS	16	0.12			
Fluoranthene	mg/kg	0.05	MCERTS	88	0.23			
Pyrene	mg/kg	0.05	MCERTS	60	0.18			
Benzo(a)anthracene	mg/kg	0.05	MCERTS	60	< 0.05			
Chrysene	mg/kg	0.05	MCERTS	54	< 0.05			
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	76	< 0.05			
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	18	< 0.05			
Benzo(a)pyrene	mg/kg	0.05	MCERTS	47	< 0.05			
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	26	< 0.05			
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	11	< 0.05			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	29	< 0.05			

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	572	1.64			
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Analytical Report Number: 19-35538

Project / Site name: Dragon Parc, Merthyr Tydfil

Lab Sample Number				1190961	1190962			
Sample Reference				TP14	TP18			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.30	0.50			
Date Sampled				28/03/2019	28/03/2019			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)				mg/kg	1	MCERTS	19	18
Beryllium (aqua regia extractable)				mg/kg	0.06	MCERTS	1.1	1.0
Boron (water soluble)				mg/kg	0.2	MCERTS	2.1	1.7
Cadmium (aqua regia extractable)				mg/kg	0.2	MCERTS	< 0.2	< 0.2
Chromium (hexavalent)				mg/kg	4	MCERTS	< 4.0	< 4.0
Chromium (aqua regia extractable)				mg/kg	1	MCERTS	12	8.6
Copper (aqua regia extractable)				mg/kg	1	MCERTS	52	61
Lead (aqua regia extractable)				mg/kg	1	MCERTS	34	26
Mercury (aqua regia extractable)				mg/kg	0.3	MCERTS	< 0.3	0.3
Nickel (aqua regia extractable)				mg/kg	1	MCERTS	28	34
Selenium (aqua regia extractable)				mg/kg	1	MCERTS	3.8	3.2
Vanadium (aqua regia extractable)				mg/kg	1	MCERTS	19	12
Zinc (aqua regia extractable)				mg/kg	1	MCERTS	68	53

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	1.7	< 1.0			
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	19	< 2.0			
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	36	< 8.0			
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	150	17			
TPH-CWG - Aliphatic >EC16 - EC35	mg/kg	10	MCERTS	180	17			
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	63	< 8.4			
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	200	23			
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	270	23			
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	1.2	< 1.0			
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	82	< 2.0			
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	400	< 10			
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	1100	< 10			
TPH-CWG - Aromatic >EC35 - EC40	mg/kg	10	NONE	27	< 10			
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	39	< 8.4			
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	1600	< 10			
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	1600	< 10			
TPH Total C5 - C44	mg/kg	10	NONE	1900	23			

Analytical Report Number: 19-35538

Project / Site name: Dragon Parc, Merthyr Tydfil

Lab Sample Number				1190961	1190962			
Sample Reference				TP14	TP18			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.30	0.50			
Date Sampled				28/03/2019	28/03/2019			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	< 1.0	-			
Chloroethane	µg/kg	1	NONE	< 1.0	-			
Bromomethane	µg/kg	1	ISO 17025	< 1.0	-			
Vinyl Chloride	µg/kg	1	NONE	< 1.0	-			
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0	-			
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0	-			
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0	-			
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0	-			
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-			
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0	-			
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	-			
Trichloromethane	µg/kg	1	MCERTS	< 1.0	-			
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0	-			
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0	-			
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0	-			
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0	-			
Benzene	µg/kg	1	MCERTS	< 1.0	-			
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0	-			
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	-			
Trichloroethene	µg/kg	1	MCERTS	< 1.0	-			
Dibromomethane	µg/kg	1	MCERTS	< 1.0	-			
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0	-			
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	-			
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	-			
Toluene	µg/kg	1	MCERTS	< 1.0	-			
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0	-			
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0	-			
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0	-			
Tetrachloroethene	µg/kg	1	NONE	< 1.0	-			
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0	-			
Chlorobenzene	µg/kg	1	MCERTS	< 1.0	-			
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	-			
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-			
p & m-Xylene	µg/kg	1	MCERTS	< 1.0	-			
Styrene	µg/kg	1	MCERTS	< 1.0	-			
Tribromomethane	µg/kg	1	NONE	< 1.0	-			
o-Xylene	µg/kg	1	MCERTS	< 1.0	-			
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	-			
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0	-			
Bromobenzene	µg/kg	1	MCERTS	< 1.0	-			
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0	-			
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	-			
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	-			
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	-			
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0	-			
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	-			
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0	-			
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0	-			
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0	-			
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	-			
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	-			
Butylbenzene	µg/kg	1	MCERTS	< 1.0	-			
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0	-			
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0	-			
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0	-			
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0	-			

Analytical Report Number: 19-35538

Project / Site name: Dragon Parc, Merthyr Tydfil

Lab Sample Number				1190961	1190962			
Sample Reference				TP14	TP18			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.30	0.50			
Date Sampled				28/03/2019	28/03/2019			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
SVOCs								
Aniline	mg/kg	0.1	NONE	< 0.1	-			
Phenol	mg/kg	0.2	ISO 17025	< 0.2	-			
2-Chlorophenol	mg/kg	0.1	MCERTS	< 0.1	-			
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	< 0.2	-			
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	-			
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	< 0.1	-			
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	-			
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	< 0.1	-			
2-Methylphenol	mg/kg	0.3	MCERTS	< 0.3	-			
Hexachloroethane	mg/kg	0.05	MCERTS	< 0.05	-			
Nitrobenzene	mg/kg	0.3	MCERTS	< 0.3	-			
4-Methylphenol	mg/kg	0.2	NONE	< 0.2	-			
Isophorone	mg/kg	0.2	MCERTS	< 0.2	-			
2-Nitrophenol	mg/kg	0.3	MCERTS	< 0.3	-			
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	< 0.3	-			
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	< 0.3	-			
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	< 0.3	-			
Naphthalene	mg/kg	0.05	MCERTS	1.8	-			
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	< 0.3	-			
4-Chloroaniline	mg/kg	0.1	NONE	< 0.1	-			
Hexachlorobutadiene	mg/kg	0.1	MCERTS	< 0.1	-			
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	< 0.1	-			
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	< 0.1	-			
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	< 0.2	-			
2-Methylnaphthalene	mg/kg	0.1	NONE	2.7	-			
2-Chloronaphthalene	mg/kg	0.1	MCERTS	< 0.1	-			
Dimethylphthalate	mg/kg	0.1	MCERTS	< 0.1	-			
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	< 0.1	-			
Acenaphthylene	mg/kg	0.05	MCERTS	0.76	-			
Acenaphthene	mg/kg	0.05	MCERTS	18	-			
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	< 0.2	-			
Dibenzofuran	mg/kg	0.2	MCERTS	6.7	-			
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	< 0.3	-			
Diethyl phthalate	mg/kg	0.2	MCERTS	< 0.2	-			
4-Nitroaniline	mg/kg	0.2	MCERTS	< 0.2	-			
Fluorene	mg/kg	0.05	MCERTS	14	-			
Azobenzene	mg/kg	0.3	MCERTS	< 0.3	-			
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	< 0.2	-			
Hexachlorobenzene	mg/kg	0.3	MCERTS	< 0.3	-			
Phenanthrene	mg/kg	0.05	MCERTS	53	-			
Anthracene	mg/kg	0.05	MCERTS	16	-			
Carbazole	mg/kg	0.3	MCERTS	3.3	-			
Dibutyl phthalate	mg/kg	0.2	MCERTS	< 0.2	-			
Anthraquinone	mg/kg	0.3	MCERTS	5.6	-			
Fluoranthene	mg/kg	0.05	MCERTS	88	-			
Pyrene	mg/kg	0.05	MCERTS	60	-			
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	< 0.3	-			
Benzo(a)anthracene	mg/kg	0.05	MCERTS	60	-			
Chrysene	mg/kg	0.05	MCERTS	54	-			
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	76	-			
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	18	-			
Benzo(a)pyrene	mg/kg	0.05	MCERTS	47	-			
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	26	-			
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	11	-			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	29	-			

Analytical Report Number: 19-35538

Project / Site name: Dragon Parc, Merthyr Tydfil

Lab Sample Number				1190961	1190962			
Sample Reference				TP14	TP18			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.30	0.50			
Date Sampled				28/03/2019	28/03/2019			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		
PCBs by GC-MS								
PCB Congener 28				mg/kg	0.001	MCERTS	< 0.001	< 0.001
PCB Congener 52				mg/kg	0.001	MCERTS	< 0.001	< 0.001
PCB Congener 101				mg/kg	0.001	MCERTS	< 0.001	< 0.001
PCB Congener 118				mg/kg	0.001	MCERTS	< 0.001	< 0.001
PCB Congener 138				mg/kg	0.001	MCERTS	< 0.001	< 0.001
PCB Congener 153				mg/kg	0.001	MCERTS	< 0.001	< 0.001
PCB Congener 180				mg/kg	0.001	MCERTS	< 0.001	< 0.001
Total PCBs by GC-MS								
Total PCBs				mg/kg	0.007	MCERTS	< 0.007	< 0.007

Analytical Report Number : 19-35538

Project / Site name: Dragon Parc, Merthyr Tydfil

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1190956	TP1	None Supplied	0.50	Grey sandy clay with gravel.
1190957	TP3	None Supplied	0.70	Grey gravelly sand.
1190958	TP7	None Supplied	0.40	Grey gravel and clinker. **
1190959	TP9	None Supplied	0.50	Grey gravel. **
1190960	TP11	None Supplied	0.50	Grey clay and gravel.
1190961	TP14	None Supplied	0.30	Grey clay and gravel.
1190962	TP18	None Supplied	0.50	Grey gravelly sand.

** Non MCerts Matrix

Analytical Report Number : 19-35538

Project / Site name: Dragon Parc, Merthyr Tydfil

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L047-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L009-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	MCERTS

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The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number : 19-35538

Project / Site name: Dragon Parc, Merthyr Tydfil

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, and MEWAM 2006 Methods for the Determination of Metals in Soil	L038-PL	D	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/cleanup.	L088/76-PL	W	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30°C.

APPENDIX D

GROUND GAS MONITORING RESULTS

FIELD GAS MONITORING RESULTS - SUMMARY

Job No.: 12392
 Site: Dragon Parc Merthyr Tydfil

Maximum Methane Concentration (%v/v)	Maximum Carbon Dioxide Concentration (%v/v)	Maximum Gas Concentration (%v/v)	Maximum Gas Flow Rate (l/hr)	GSV (l/hr)
<0.5	2.10	2.10	<0.3	<0.0063

Methane							
Location	Round 1	Round 2	Round 3	Round 4	Round 5	Round 6	Maximum
PH 1	<0.5						<0.50
PH 8	<0.5						<0.50
PH 10	<0.5						<0.50
PH 13	<0.5						<0.50
PH 16	<0.5						<0.50
PH 18	<0.5						<0.50

Carbon Dioxide							
Location	Round 1	Round 2	Round 3	Round 4	Round 5	Round 6	Maximum
PH 1	0.60						0.60
PH 8	2.10						2.10
PH 10	0.40						0.40
PH 13	0.10						0.10
PH 16	0.30						0.30
PH 18	0.10						0.10

Oxygen							
Location	Round 1	Round 2	Round 3	Round 4	Round 5	Round 6	Minimum
PH 1	21.20						21.20
PH 8	18.10						18.10
PH 10	20.20						20.20
PH 13	20.10						20.10
PH 16	20.20						20.20
PH 18	20.10						20.10

Gas Flow Rate							
Location	Round 1	Round 2	Round 3	Round 4	Round 5	Round 6	Maximum
PH 1	<0.3						<0.30
PH 8	<0.3						<0.30
PH 10	<0.3						<0.30
PH 13	<0.3						<0.30
PH 16	<0.3						<0.30
PH 18	<0.3						<0.30

FIELD GAS MONITORING RESULTS

Job No.: 12392
 Site: Dragon Parc Merthyr Tydfil
 Monitoring Date: 24.04.19
 Monitoring Round: 1

Monitoring Conditions

Weather: Raining
 Ambient Temp: 8 °C
 Instrument: GA5000

Barometric Pressure (mb)

On Arrival: 978
 During Monitoring: 978
 End of Monitoring: 978

Location	Well Base Level (mbgl)	Water Level (mbgl)	Methane (CH ₄) %v/v		Methane % LEL		Oxygen (O ₂) %v/v		Carbon Dioxide (CO ₂) %v/v		Carbon Monoxide (CO) (ppm)	Hydrogen Sulphide (H ₂ S) (ppm)	Peak Gas Flow (l/hr)	VOC Vapours (ppm>background)
			Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady				
PH 1	5.02	4.84		<0.5			21.20	21.20	0.60	0.60	<1	<1	<0.3	3.10
PH 8	3.07	Dry		<0.5			18.10	18.10	2.10	2.10	<1	<1	<0.3	0.40
PH 10	3.6	Dry		<0.5			20.20	20.20	0.40	0.20	<1	<1	<0.3	2.80
PH 13	4.1	Dry		<0.5			20.10	20.10	0.10	0.10	<1	<1	<0.3	0.80
PH 16	3.26	Dry		<0.5			20.20	20.20	0.30	0.20	<1	<1	<0.3	1.50
PH 18	3.18	Dry		<0.5			20.10	20.20	0.10	0.10	<1	<1	<0.3	0.40
Typical Instrument Accuracy: %CH₄ 0-70% +/- 0.5% CO 0-500ppm +/- 2% FS %CO₂ 0-60% +/- 0.5% H₂S 0-5000ppm +/- 2.0% FS %O₂ 0-25% +/- 1.0% Flow from borehole +/- 0.3l/h LEL = Lower Explosive Limit N/R = No Reading Taken FS = Full Scale														
Notes:														

APPENDIX E

SUMMARY OF CHEMICAL TEST RESULTS

SUMMARY OF LABORATORY SOIL TEST RESULTS

METALS AND SEMI-METALS

Job No.: 12392
Site: Dragon Parc, Abercanaid
Soil Type: Made Ground
Soil Organic Matter: 1%

No.	Location	Depth (m)	Arsenic (mg/kg)	Boron (mg/kg)	Beryllium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Chromium (VI) (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Mercury (Elemental) (mg/kg)	Nickel (mg/kg)	Selenium (mg/kg)	Vanadium (mg/kg)	Zinc (mg/kg)
1	TP1	0.50	9.1	2.1	1.0	< 0.2	8.8	< 4.0	56	22	< 0.3	33	< 1.0	16	63
2	TP3	0.70	26	1.1	1.3	< 0.2	17	< 4.0	89	190	2.2	30	< 1.0	33	140
3	TP7	0.40	22	1.9	2.1	< 0.2	28	< 4.0	91	110	< 0.3	30	< 1.0	57	99
4	TP9	0.50	11	1.6	0.92	< 0.2	6.8	< 4.0	48	20	1.1	29	4.4	9.5	64
5	TP11	0.50	15	1.1	0.96	< 0.2	8.4	< 4.0	62	29	0.6	36	4.3	16	64
6	TP14	0.30	19	2.1	1.1	< 0.2	12	< 4.0	52	34	< 0.3	28	3.8	19	68
7	TP18	0.50	18	1.7	1.0	< 0.2	8.6	< 4.0	61	26	0.3	34	3.2	12	53
Screening Criteria Value			37.0	290.0	1.7	11.0	-	6.0	2400.0	200.0	1.2	130.0	250.0	410.0	3700.0
Source of Screening Criteria Value			S4UL	S4UL	S4UL	S4UL	-	S4UL	S4UL	C4SL	S4UL	S4UL	S4UL	S4UL	S4UL

SUMMARY OF LABORATORY SOIL TEST RESULTS

INORGANIC CHEMICALS & OTHERS

Job No.: 12392
 Site: Dragon Parc, Abercanaid
 Soil Type: Made Ground
 Soil Organic Matter: 1%

No.	Location	Depth (m)	Cyanide (mg/kg)	Loss on ignition, dried solids (%)	Moisture content at 30 C (%)	Phenol (mg/kg)	pH (pH units)	Water Soluble Sulphate (g/l)	Sulphate Total as SO4 (mg/kg)	Sulphide (mg/kg)	Total Sulphur (mg/kg)	TOC by Ignition in O2 (%)	Equivalent SOM (%)	Asbestos in Soil	Asbestos Quantification (%)
1	TP1	0.50	< 1	21.5	11	< 1.0	8.6	0.14	970	6.3	1000	1.7	2.92	Not-detected	#N/A
2	TP3	0.70	< 1	18.8	13	< 1.0	7.7	0.46	2000	160	1500	3.8	6.54	Not-detected	#N/A
3	TP7	0.40	< 1	16.8	9.7	< 1.0	8.4	0.19	2100	450	2100	3.7	6.36	Not-detected	#N/A
4	TP9	0.50	< 1	24.1	4.5	< 1.0	8.5	0.25	2900	17	1800	2.2	3.78	Not-detected	#N/A
5	TP11	0.50	< 1	24.4	9.6	< 1.0	8.1	0.15	1200	< 1.0	790	3.1	5.33	Not-detected	#N/A
6	TP14	0.30	< 1	20.3	9.6	< 1.0	8.3	1.4	5100	88	3100	3.4	5.85	Not-detected	#N/A
7	TP18	0.50	< 1	16.6	4.5	< 1.0	7.9	2.2	6700	8.0	2600	1.3	2.24	Not-detected	#N/A
Screening Criteria Value			34.0	-	-	280.0	-	-	-	-	-	-	-	-	0.001
Source of Screening Criteria Value			ATRISK	-	-	S4UL	-	-	-	-	-	-	-	-	IOM

SUMMARY OF LABORATORY SOIL TEST RESULTS

POLYAROMATIC HYDROCARBONS (PAH)

Job No.: 12392
Site: Dragon Parc, Abercanaid
Soil Type: Made Ground
Soil Organic Matter: 1%

No.	Location	Depth (m)	Acenaphthene (mg/kg)	Acenaphthylene (mg/kg)	Anthracene (mg/kg)	Benzo(a)anthracene (mg/kg)	Benzo(a)pyrene (mg/kg)	Benzo(b)fluoranthene (mg/kg)	Benzo(ghi)perylene (mg/kg)	Benzo(k)fluoranthene (mg/kg)	Chrysene (mg/kg)	Dibenzo(ah)anthracene (mg/kg)	Fluoranthene (mg/kg)	Fluorene (mg/kg)	Indeno(123cd)pyrene (mg/kg)	Naphthalene (mg/kg)	Phenanthrene (mg/kg)	Pyrene (mg/kg)
1	TP1	0.50	< 0.05	< 0.05	0.23	0.49	< 0.05	< 0.05	< 0.05	< 0.05	0.26	< 0.05	0.74	< 0.05	< 0.05	0.80	1.4	0.57
2	TP3	0.70	< 0.05	< 0.05	0.19	1.0	1.0	0.81	0.70	0.75	1.0	< 0.05	1.7	< 0.05	0.47	0.28	1.0	1.4
3	TP7	0.40	< 0.05	< 0.05	0.16	0.61	0.55	0.52	0.32	0.53	0.66	< 0.05	0.77	< 0.05	0.26	0.36	0.86	0.62
4	TP9	0.50	< 0.05	< 0.05	0.20	0.46	0.13	0.30	< 0.05	0.22	0.37	< 0.05	0.56	< 0.05	< 0.05	0.85	1.4	0.50
5	TP11	0.50	0.36	< 0.05	0.42	1.4	0.87	1.3	0.53	0.70	0.94	< 0.05	1.7	0.22	0.53	0.94	2.1	1.2
6	TP14	0.30	18	0.76	16	60	47	76	29	18	54	11	88	14	26	1.8	53	60
7	TP18	0.50	< 0.05	< 0.05	0.12	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.23	< 0.05	< 0.05	0.41	0.70	0.18
Screening Criteria Value			210.0	170.0	2400.0	7.2	2.2	2.6	320.0	77.0	15.0	0.2	280.0	170.0	27.0	2.3	95.0	620.0
Source of Screening Criteria Value			S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL

SUMMARY OF LABORATORY SOIL TEST RESULTS

PETROLEUM HYDROCARBONS

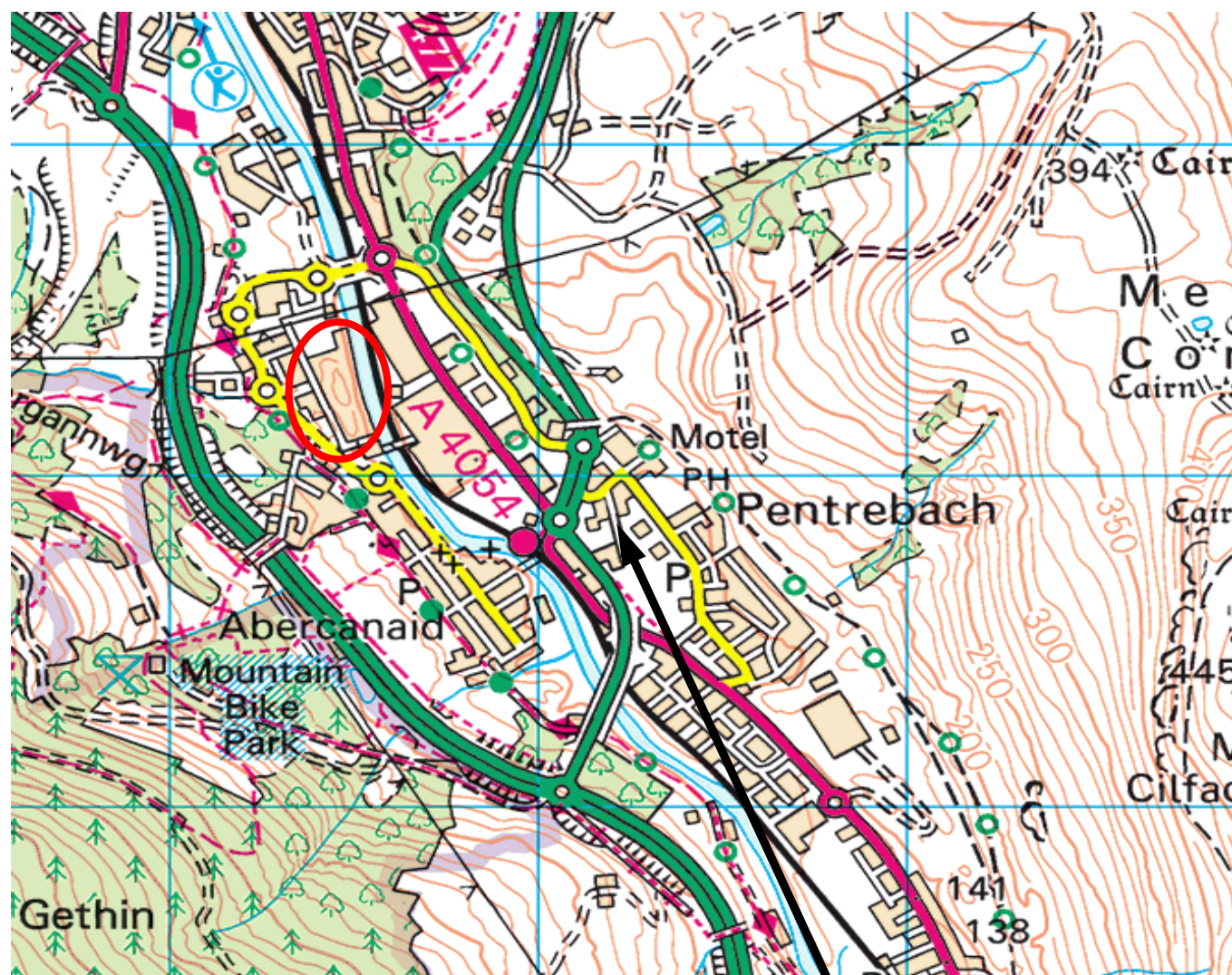
Job No.: 12392
Site: Dragon Parc, Abercanaid
Soil Type: Made Ground
Soil Organic Matter: 1%

No.	Location	Depth (m)	Aliphatic C5-C6 (mg/kg)	Aliphatic C6-C8 (mg/kg)	Aliphatic C8-C10 (mg/kg)	Aliphatic C10- C12 EPH (mg/kg)	Aliphatic C12- C16 EPH (mg/kg)	Aliphatic C16-C35 EPH (mg/kg)	Aliphatic C35- C44 EPH (mg/kg)	Aromatic C5-C7 (mg/kg)	Aromatic C7-C8 (mg/kg)	Aromatic C8-C10 (mg/kg)	Aromatic C10- C12 EPH (mg/kg)	Aromatic C12- C16 EPH (mg/kg)	Aromatic C16- C21 EPH (mg/kg)	Aromatic C21- C35 EPH (mg/kg)	Aromatic C35- C40 EPH (mg/kg)
1	TP1	0.50	< 0.001	< 0.001	< 0.001	1.7	10	53	< 8.4	< 0.001	< 0.001	< 0.001	2.2	9.9	21	46	< 8.4
2	TP3	0.70	< 0.001	< 0.001	< 0.001	1.4	8.4	58	< 8.4	< 0.001	< 0.001	< 0.001	< 1.0	3.7	19	29	< 8.4
3	TP7	0.40	< 0.001	< 0.001	< 0.001	< 1.0	2.2	37	16	< 0.001	< 0.001	< 0.001	< 1.0	3.8	13	75	< 8.4
4	TP9	0.50	< 0.001	< 0.001	< 0.001	< 1.0	2.4	23	< 8.4	< 0.001	< 0.001	< 0.001	< 1.0	4.5	< 10	< 10	< 8.4
5	TP11	0.50	< 0.001	< 0.001	< 0.001	2.0	4.9	140	16	< 0.001	< 0.001	< 0.001	< 1.0	4.6	18	110	< 8.4
6	TP14	0.30	< 0.001	< 0.001	< 0.001	1.7	19	180	63	< 0.001	< 0.001	< 0.001	1.2	82	400	1100	39
7	TP18	0.50	< 0.001	< 0.001	< 0.001	< 1.0	< 2.0	17	< 8.4	< 0.001	< 0.001	< 0.001	< 1.0	< 2.0	< 10	< 10	< 8.4
Screening Criteria Value			42.0	100.0	27.0	130.0	1100.0	65000.0	65000.0	0.1	130.0	34.0	74.0	140.0	260.0	1100.0	1100.0
Source of Screening Criteria Value			S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL

FIGURES



NORTH



1000m

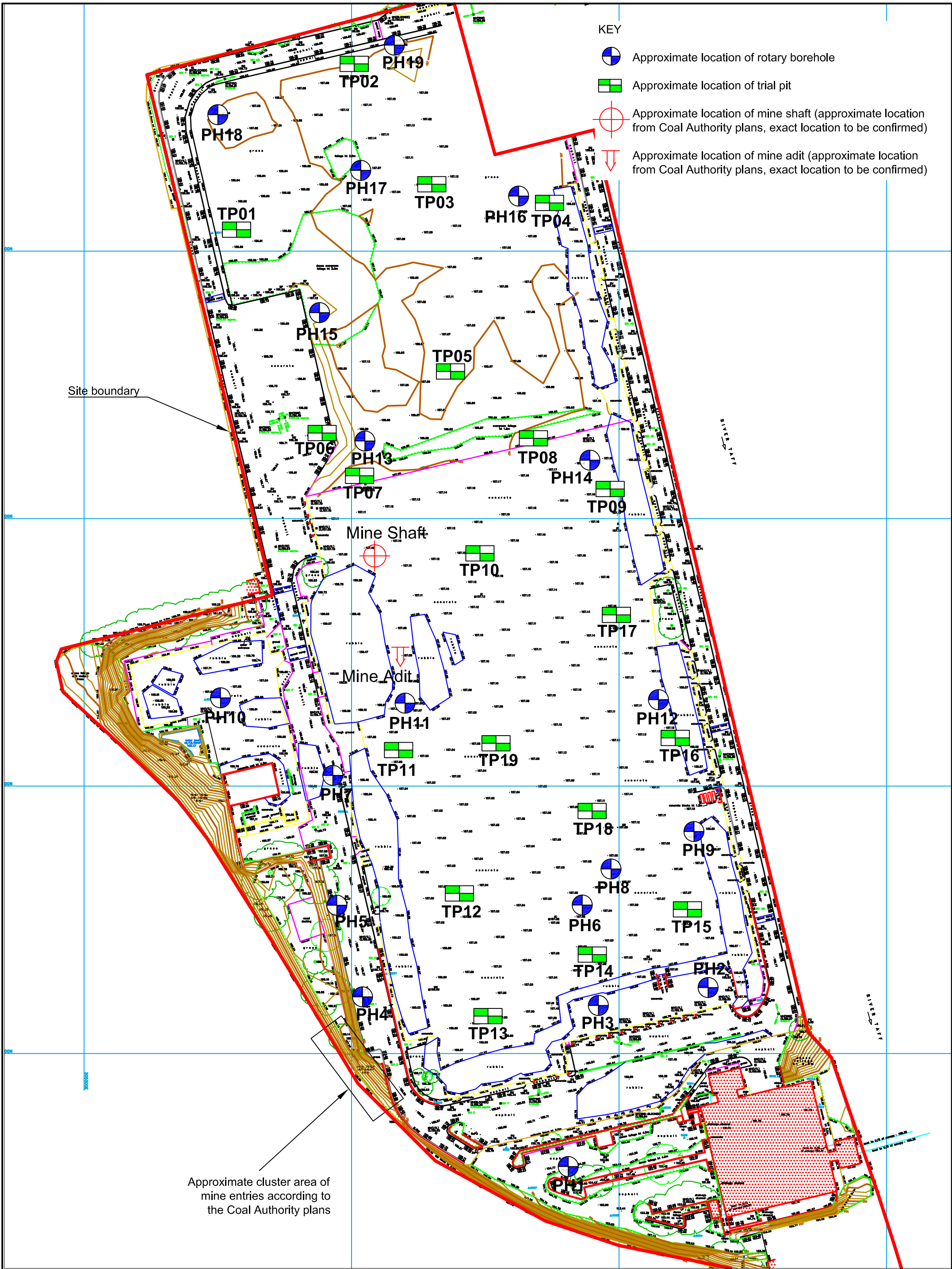
**SITE
LOCATION**

FIGURE 1 - SITE LOCATION

Dragon Parc, Abercanaid, Methyr Tydfil

Intégral
Géotechnique

Intégral House
7 Beddau Way
Castlegate Business Park
Caerphilly
CF83 2AX
Tel: 029 2080 7991
Fax: 029 2086 2176



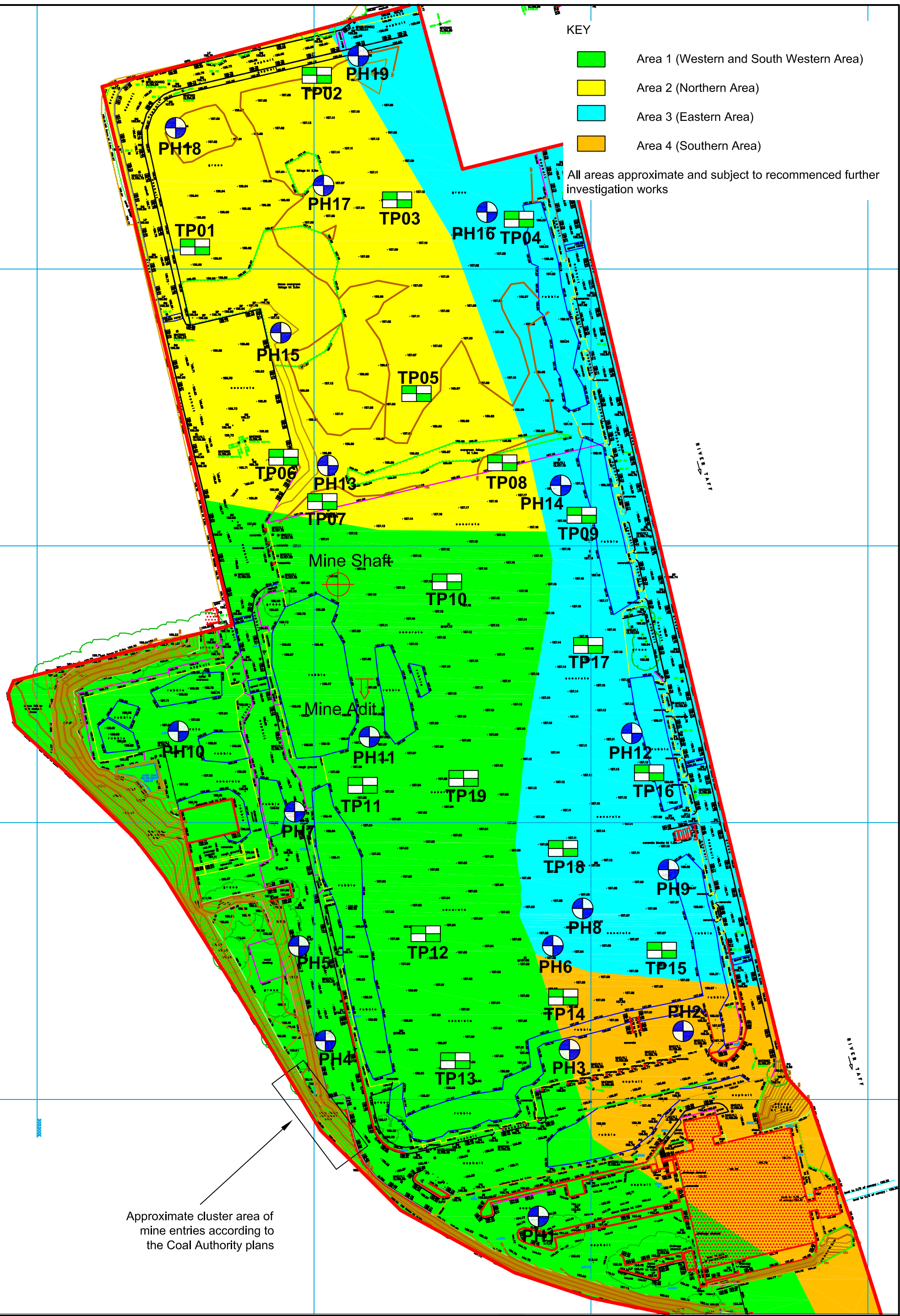


Figure 3: Mining Risk Zones